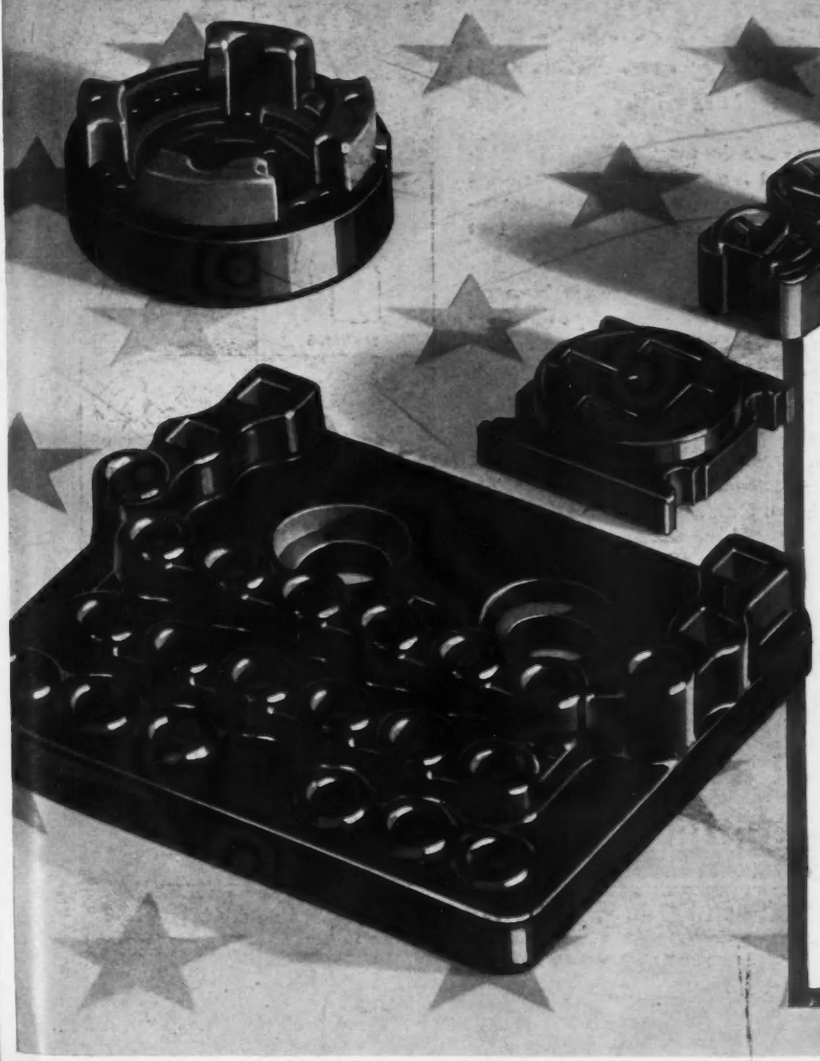
Sept. 1930

Electrical Manufacturing

Vol. 6 A Gage Publication No. 3

NU-BLAC*



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It is black all through and takes the black glaze with a high, lustrous finish.

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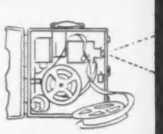
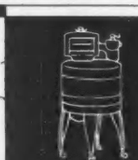

PORTABLE PROJECTORS


WASHING MACHINES

HEATER CORD SETS

IRONERS

VIOLET RAY LAMPS

EXERCISERS

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ELECTRIC PHONOGRAPHS

FLOOR MACHINES

RADIO SPEAKERS

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Gone are the days of the old breakable plug! The Belden *Plug Unbreakable for Things Electrical* eliminates the inconvenience of broken and bent plugs that once had to be tolerated.

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Belden
SOFT RUBBER PLUG

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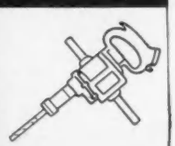
RADIO SETS

VACUUM CLEANERS

SPRAYERS

REFRIGERATORS

BUSINESS MACHINES


ELECTRIC DRILLS

LAMPS

JUICE EXTRACTORS

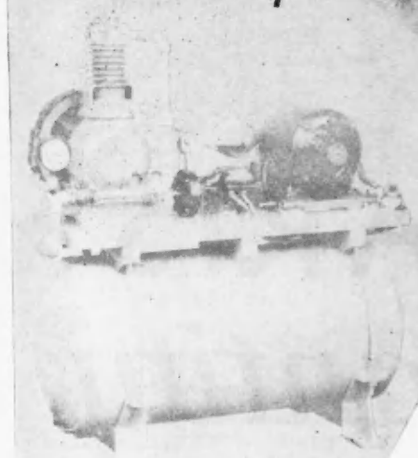
KITCHEN MIXERS

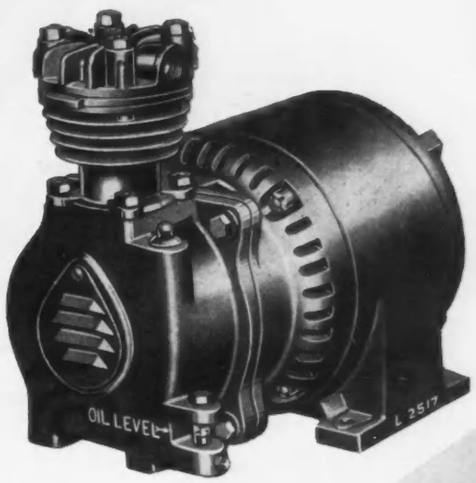
and many more

The Plug Unbreakable for Things Electrical

THE OLD GIVES WAY TO THE NEW

Modern Principles Guide the Application of Motor to Machine





Established on the principle that the motor and the machine which it drives should be designed to fit each other in an attractive, efficient unit, the Product Engineering Division of The Master Electric Company is prepared to cooperate with manufacturers' engineers in the solution of *special* problems in motor application.

When the motor is built with due regard for the machine of which it is to become a part, and the machine is designed to receive that motor—refinements are very often possible, which produce distinct advantages over the result when the motor was "added on" haphazardly

Our experience has shown that one or more of the following benefits are realized as the result of re-design, treating the machine and the motor as related parts of a complete unit:

Production cost is reduced by the elimination of belts, gears and other parts.

Better over-all efficiency is obtained, with a resultant lowering of operating cost.

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The manufacturer retains control of the type and style of motor on his machine, assuring him his profit on the sale of the motor.

The creating and building of a "Special" motor is not necessarily costly. The Master Electric Company is in an excellent position not only to design a "Power Diamond" especially for your product, but to build it on a quantity production basis at a moderate cost. Write for information.

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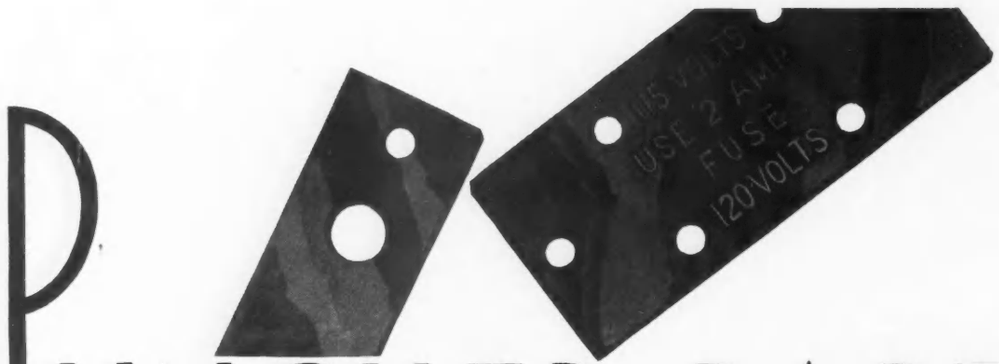
The POWER DIAMOND

STOCKS CARRIED IN PRINCIPAL CITIES

MORE THAN 100 SERVICE STATIONS

MASTER GUARANTEED MOTORS

1/30 TO 10 H.P. Dayton THE MASTER ELECTRIC CO. Ohio *Not More Than 40°*



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Electrical Manufacturing

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Volume 6 SEPTEMBER, 1930 Number 3

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ELECTRICAL MANUFACTURING'S editorial program has the following objectives:

Production

To help all electrical manufacturers, including makers of motor-driven products, increase the product's salability, cut unit production costs, quicken turnover, reduce overhead expenses, establish standard methods of work, and spread a better knowledge of raw materials and parts.

Marketing

To spread a better knowledge of and aid electrical manufacturers in adjusting sales management to the buyers' market, to aid in making advertising more effective, finding the most profitable distribution channels, and promoting cooperative market development.

Administration

To further the working out of sounder management policies and better executive control, coordinating sales and production schedules, promoting research, and developing better industry relations.

Repairing

To help all motor repair shops to build better business by developing a sounder organization, improving management, policies and methods, and developing a keener merchandising point-of-view on the business.

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WHITMAN

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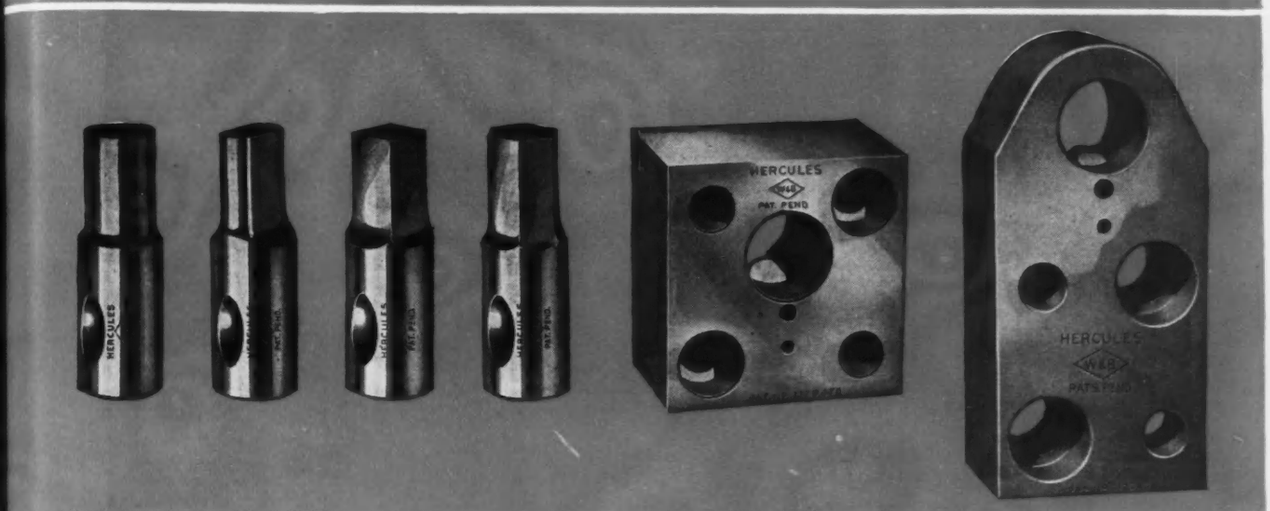
Modern Punch Practice



Increase Production—Save Money On All Punch Work

HOLDS SECURELY
RELEASES FREELY

Hercules Interchangeable Punches and Retainers are adaptable to practically all punching operations. Manufacturing precision makes the retainers as interchangeable as the punches and effects many economies over ordinary die building. • The retainers attach to standard die shoes and are aligned with regular die buttons in a very simple and easy manner. • Punches are furnished in a wide range of standard sizes with round, oblong, square and hexagonal piercing ends—always ready for immediate shipment. • In addition to the desirable interchangeable feature, Hercules Punches set a new standard for punch performance. Superior steel and controlled heat treating have been combined to produce a punch far in advance of usual accepted punch standards. • Every operator of punch press, large or small, can profit by this modern system of punches. Our catalog gives complete details, and valuable information on punch press operation. Learn all about it now—send for your copy today, while it's fresh in your mind. • Ask for Catalog No. 94.

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2. **Lower Die Building Cost**
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4. **Reduced "down time" for die repairs**
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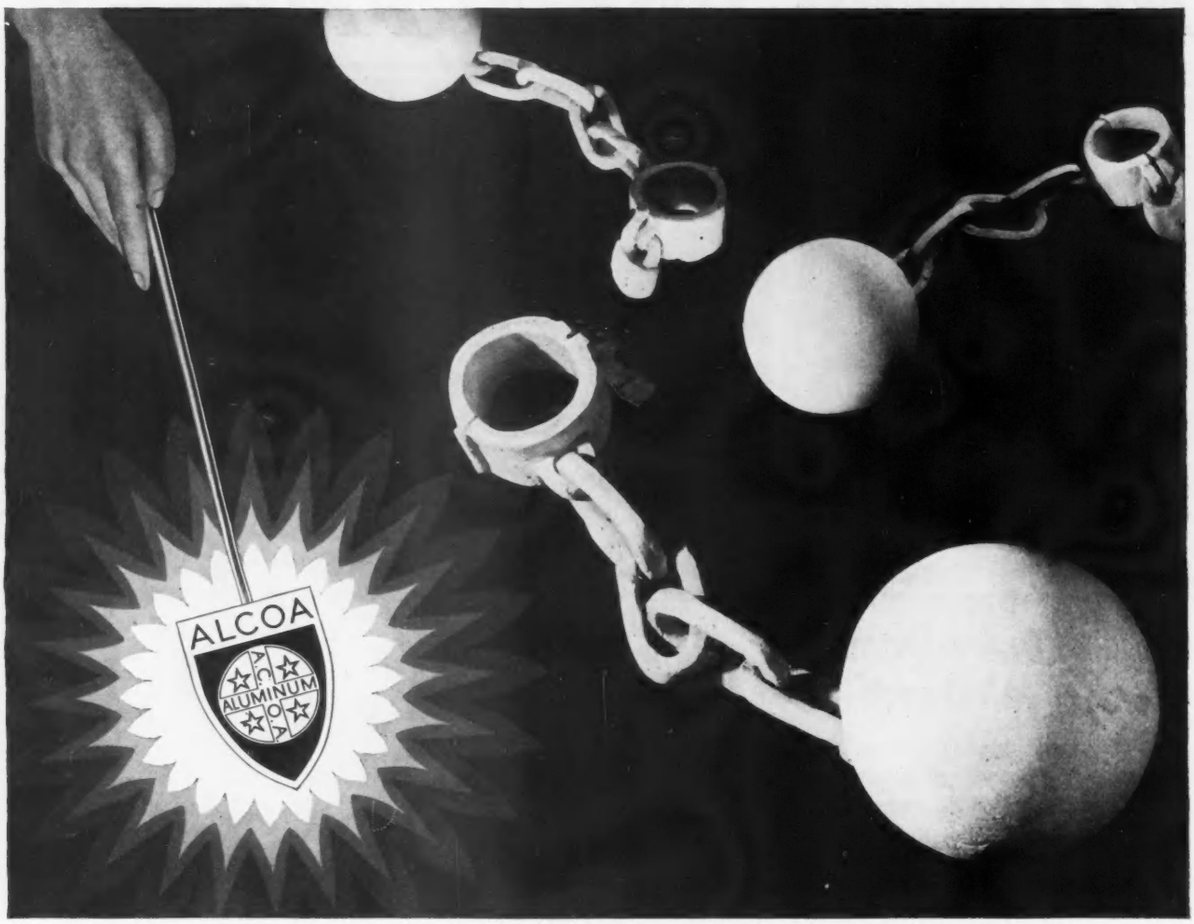
MAKERS OF FINE TOOLS FOR 76 YEARS

LIGHT TO WOMAN'S TOUCH . . . STRONG TO SERVE



Any woman would rather work with a wand than a spade. Remember this as you sell; point out Alcoa Aluminum. In vacuum cleaners women prefer this modern metal, they love its lightness—they recognize it by its silvery sheen. In electric ranges they appreciate its heat transmitting qualities. When it comes to percolators they know its cleanly safety in contact with food. And waffle grids need never be greased when made of Alcoa Aluminum Alloys. All of these sales arguments are yours to use. Remember Alcoa Aluminum marks a modern product as against one made of heavier old fashioned metals.

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There is a wealth of new information about the use of bronze bearings and parts in electric motors and appliances, and a very apparent opportunity to greatly enhance the performance of these mechanisms and the market position of electrical manufacturers. Let our engineers and metallurgists help you determine exactly what your particular applications require. You will not be committed or obligated in any way.

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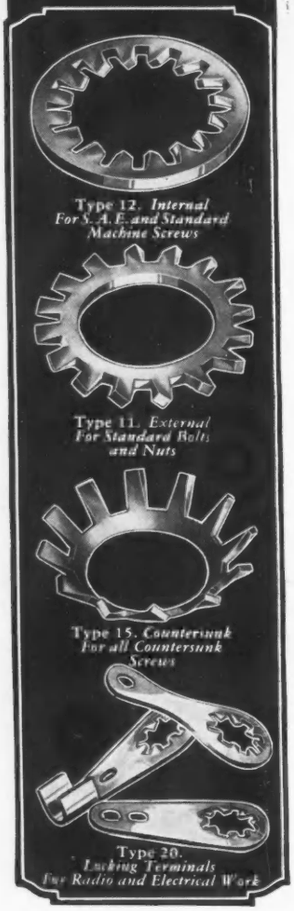

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For S. A. E. and Standard Machine Screws

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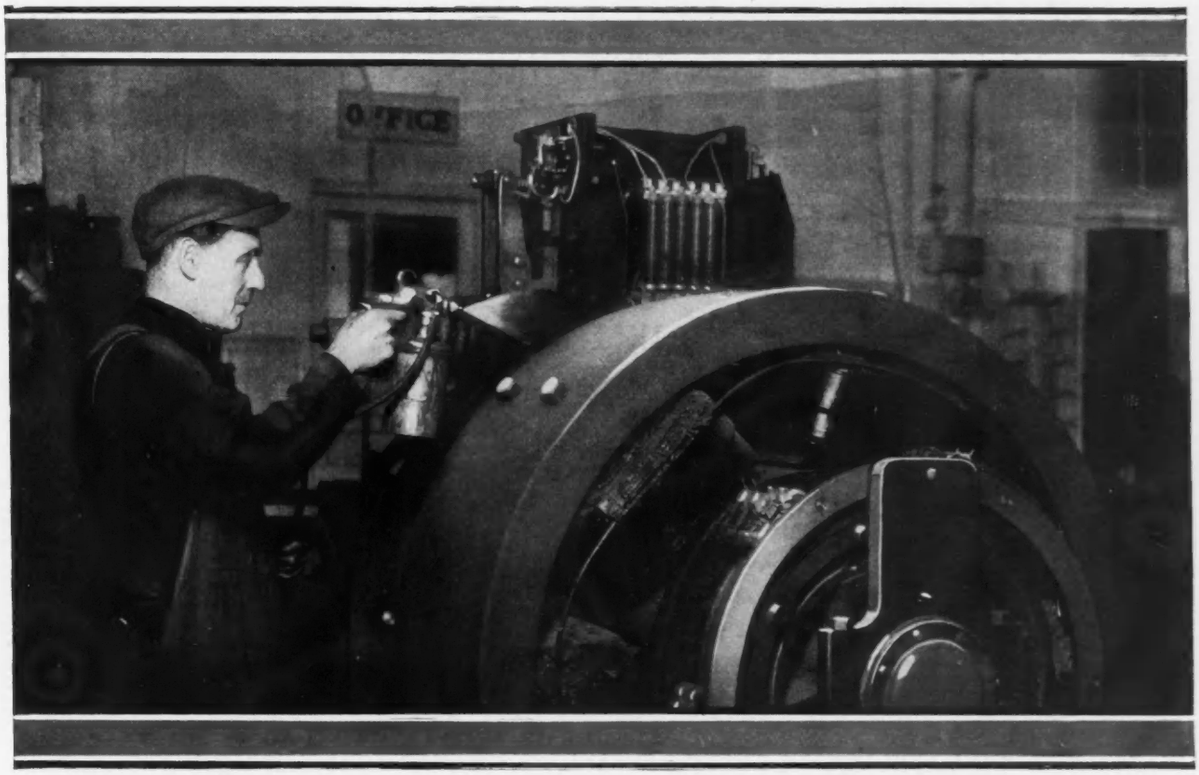
{Division of Illinois Tool Works}
2533 North Keeler Ave., Chicago, Illinois

"It's the Twisted Teeth that LOCK"



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If you have a problem in electrical-motored machinery, come to Robbins & Myers. We offer you the facilities of a completely modern plant, and the experience of 32 years' precision manufacture in designing, building and applying electric motors, generators, fans, and electrical appliances

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Churns
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Conveyors
Dental Lathes
Dish Washers
Driers
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Folding Machines
Heaters
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Hoists
Humidifiers
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Labeling Machines
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Machine Tools
Meat Choppers
Milking Machines
Movie Projectors
Phonographs
Portable Tools
Printing Presses
Pumps
Radio Stations and Receiving Sets
Spray Equipment
Ticket Selling Machines
Vacuum Cleaners
Ventilating Fans
Unit Heaters
Washing Machines
Wrapping Machines

Robbins & Myers, Inc.

Springfield, Ohio Brantford, Ontario

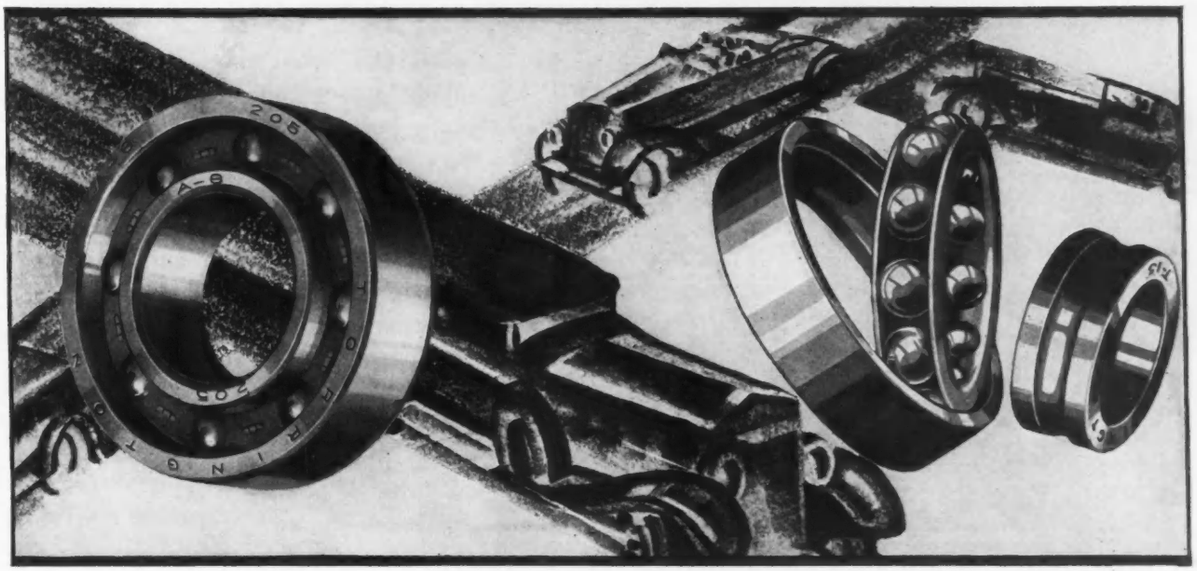
1878

1930

MOTORS, FANS, HAND AND ELECTRIC HOISTS AND CRANES

THE WORLD FIGHTS FRICTION

TORRINGTON
BALL BEARINGS
OVERCOME FRICTION



THE world's fight against friction, successively illustrated in previous Torrington advertisements, finally culminated in the invention of the ball bearing.

Wherever machinery is manufactured or used, the efficiency of ball bearings is recognized and the reputation of Torrington Ball Bearings is firmly established.

Torrington Ball Bearings are satisfactory, economical anti-friction devices. They operate smoothly under widely variable speed and load conditions. Shock and vibration do not affect them.

Torrington Ball Bearings are made by specialists for many years in precision manufacturing. The accuracy of Torringtons therefore is dependable—an accuracy which will enhance the life and service of your products.

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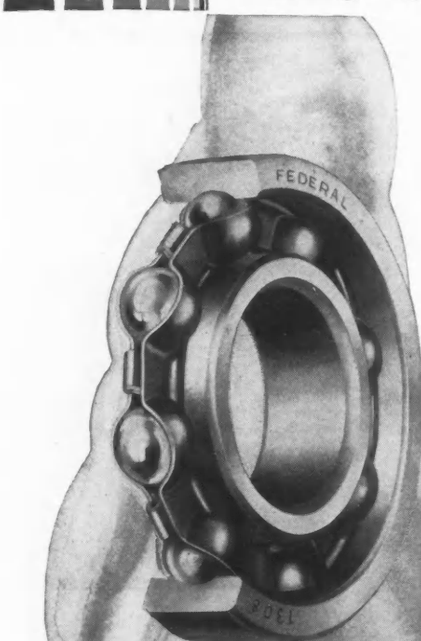
Users of Bearings Buy FEDERALS Year After Year



MANUFACTURERS who once use FEDERAL BALL BEARINGS continue to buy "FEDERALS" year after year—because of the exceptional quality of these bearings. There is no question about "FEDERAL" performance. They stand up under the most gruelling service. They represent the last word in bearing design and construction. Better bearings cannot be had at any price, and it is this outstanding factor that contributes to the fame and popularity of "FEDERALS."

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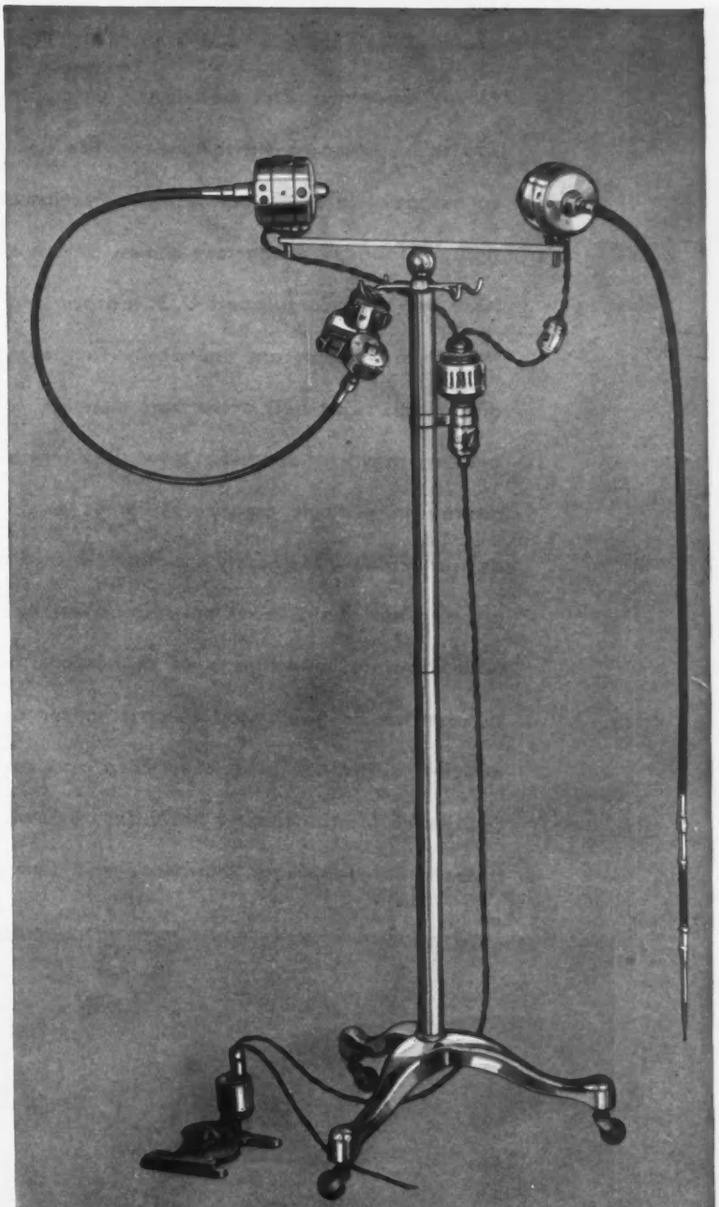
Detroit Sales Office: 917 *Book Bldg.*

FEDERAL
RADIAL BALL BEARINGS

This Versatile Apparatus is DUMORE Equipped . . . for dependable PERFORMANCE



THE "Twin" Massage and Chiropody Machine, illustrated opposite is one of several units built by the Moore Electric Corporation, Chicago. Smooth, dependable operation of these devices is assured by Dumore Fractional H. P. Motors.

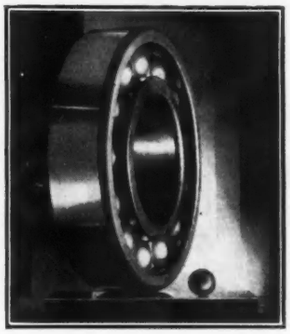
Dynamic balance, vibration free, precise construction and other qualities, exclusive to Dumore, make Dumore Motors adaptable to any unit requiring fractional horse-power driving energy.

If you have a product that has any possibility of becoming "motored" consult us — over twenty-five years experience in motor building and adaptation.

THE DUMORE COMPANY
35 Sixteenth Street Racine, Wisconsin

DUMORE
FRACTIONAL HORSEPOWER
MOTORS

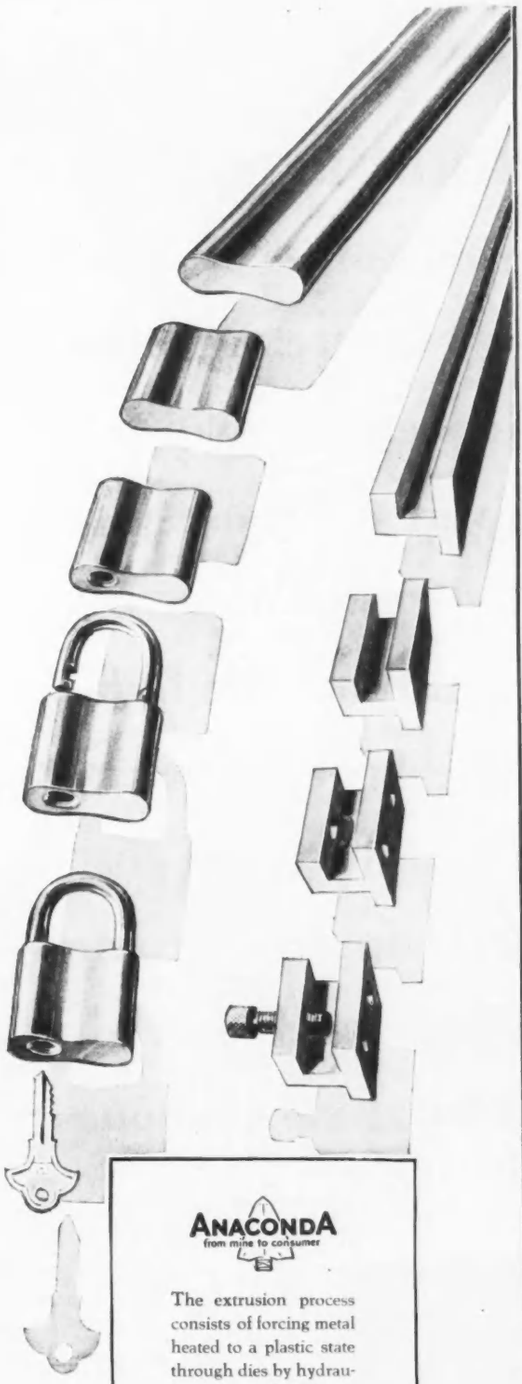
New Departures keep motors clean



New Departure Ball Bearings, with lubricant tightly sealed in, bring to electric motors the cleanliness that is so essential in some mountings. For instance, the centrifugal laundry extractors shown below are driven by New Departure-equipped U. S. motors and there is not the slightest lubricant leakage. Furthermore, a short, direct and tight belt drive was desired, so the motors are vertically mounted. New Departures save real money in difficult mountings like these, because the design problem is greatly simplified with a single, simple bearing unit which carries thrust as well as radial loads, with absolute smoothness at all speeds. Specify New Departures on your next electric motor order — you'll notice a difference in upkeep care and cost. The New Departure Manufacturing Company, Bristol, Connecticut; Detroit, Chicago, San Francisco, and London, England.

Nothing Rolls
Like a Ball

NEW DEPARTURE BALL BEARINGS



ANACONDA
from mine to consumer

The extrusion process consists of forcing metal heated to a plastic state through dies by hydraulic pressure. It is due to this method that the resulting shapes are smooth of surface, uniformly dense, and accurate to dimension throughout their entire length.

Manufacturers using EXTRUDED SHAPES *reduce machining and finishing costs*

MANY manufacturers have found that production costs can be materially reduced, and the quality of their products improved by the use of extruded shapes.

Anaconda Extruded Shapes are so accurately gauged and so smooth of surface, that considerable time is saved in machining and finishing operations... with resulting economies that generally far more than offset the slightly higher cost per pound of extruded metal. Anaconda Extruded Shapes are close grained and free from spills, blow-holes, and other defects found in sand castings. This reduces rejections to a minimum and saves machining and finishing often wasted when hidden defects are revealed during these operations.

Wherever functional requirements permit a reduction in wall thickness extruded parts save metal because of their high tensile strength (twice that of cast metal).

Further information gladly sent on request or a representative will call at your convenience. Quotations may be secured by sending us blue prints or drawings of shapes with full details as to sizes and quantities desired.

THE AMERICAN BRASS COMPANY

General Offices: Waterbury, Connecticut

Offices and Agencies in Principal Cities

Canadian Mill: Anaconda American Brass Ltd.
New Toronto, Ontario

ANACONDA
EXTRUDED SHAPES

ELECTRICAL INSTALLATION RECORD is to-day in the strongest position of its 38 year history of electrical industry service. Devoted specifically to the function of electrical installation, it cultivates exclusively *all* those factors engaged in wiring and installation, regardless of groups. They constitute the bulk of its paid circulation, whose proven preference is now intensified. The advertising possibilities of this broad, direct approach command the attention of every manufacturer of products consumed in electrical installation.

A. B. C. *Electrical Installation Record* A. B. P.

THE GAGE PUBLISHING COMPANY, INC.
461 Eighth Ave., New York, N. Y.

Publishers to the Electrical Industry Since 1892

INCA

AMERICA'S GREAT SOURCE OF MAGNET WIRE *and* COILS

WHEREVER magnet wire and coils are used, the name INCA has come to be symbolic of America's great source of dependable copper wire products.

The steadily growing number of satisfied customers constitutes a glowing tribute to the success of INCA'S avowed purpose to give the industry products of surpassing merit.

And then there is the matter of service . . . always friendly, always sincerely interested in the problems of the manufacturer.

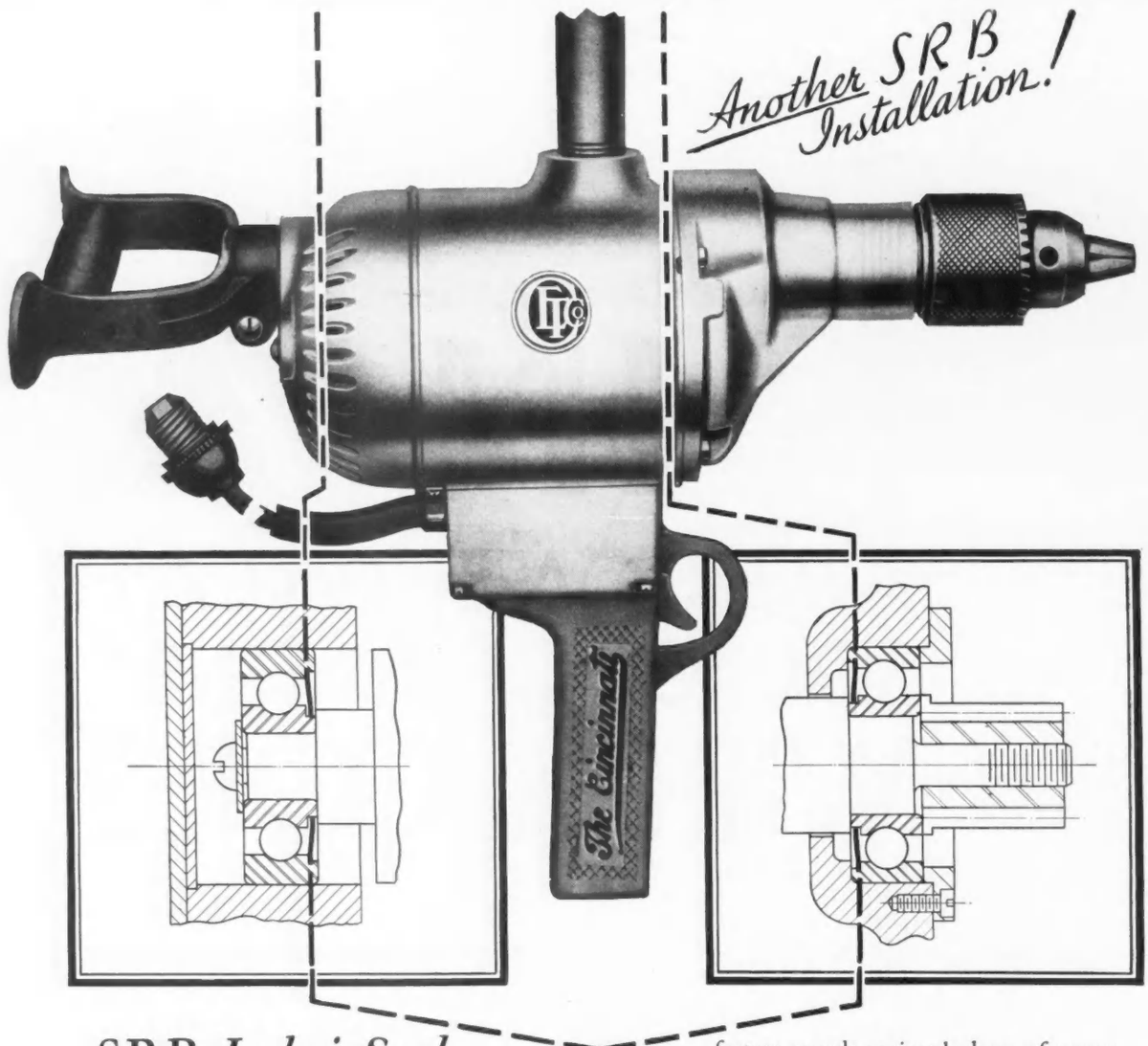
Inca engineers, without obligating you, will be glad to discuss matters concerning magnet wire and coils.

INCA

Symbolic of the best in the copper wire industry

NATIONAL ELECTRIC PRODUCTS CORPORATION
INCA MANUFACTURING DIVISION
Copper Wire Products—Fort Wayne, Ind.

Eastern Office, Newark, N. J. Industrial Office Building
West. Rep., A. S. Lindstrom, 274 Brannan St., San Francisco, Cal.



SRB *Lubri-Seal*
BALL BEARINGS *in*
The Cincinnati
TRADE MARK
ELECTRIC DRILLS

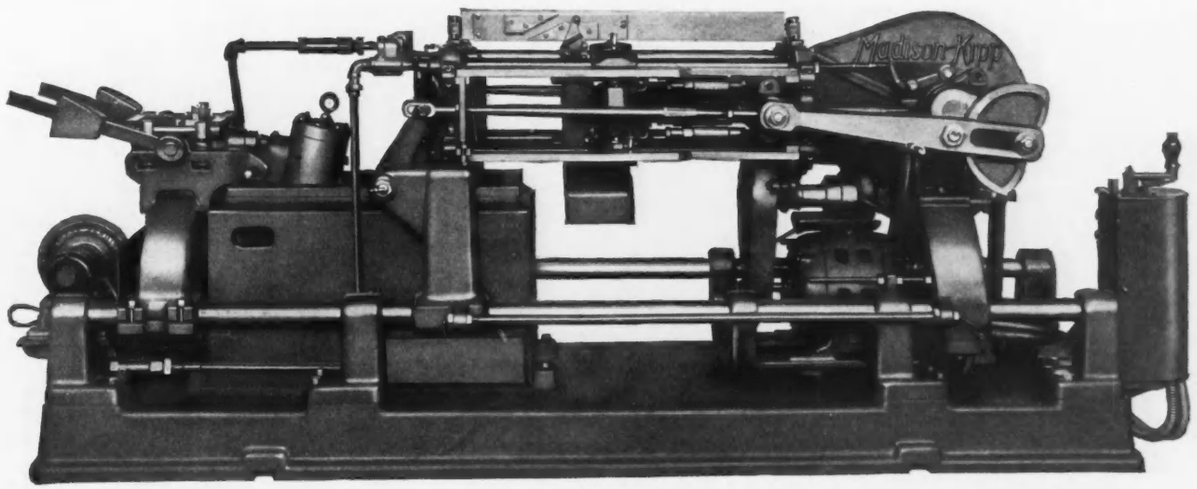
ANOTHER manufacturer of Portable Electric Tools who uses SRB *Lubri-Seal* Ball Bearings for increased efficiency and improved performance!

In this application, the *Lubri-Seal* feature guards against leakage of grease to the windings, at the same time excluding dirt and grit from the bearing housing. Lubrication is required only at rare intervals...maintenance is reduced to an absolute minimum.

Let our engineers show you how to *"Lubri-Seal"* your own product for increased efficiency and improved performance.

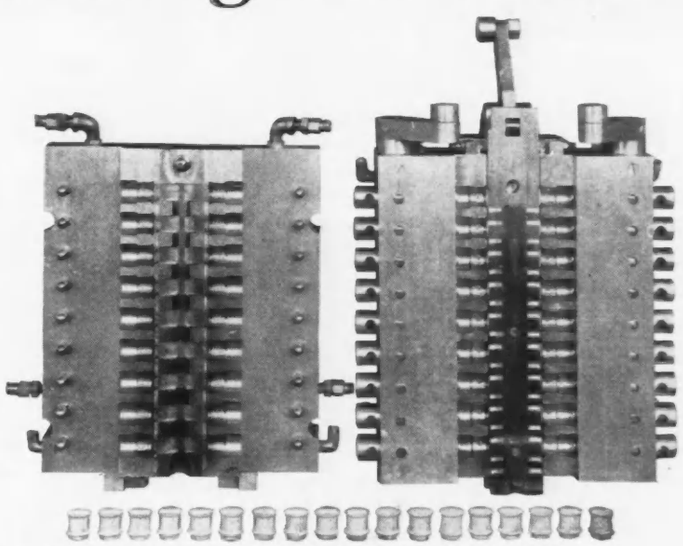
STANDARD STEEL AND BEARINGS INCORPORATED
Plainville, Connecticut
DIVISION OF MARLIN-ROCKWELL CORPORATION

Ball SRB Bearings



6,012 Lead Castings in 1 Hour

Cast and *Trimmed* In This Die On Its Trial Run



Madison-Kipp, who produced the first highly-developed, fully automatic, universal die casting machine, design and build for their clients high-production die casting dies.

Illustrated here is an 18-cavity die for casting a lead part, for trimming it in the die and for ejecting it at an unprecedented speed in a finished condition ready to be put into its assembly without requiring a single machine or hand operation, or even inspection in this case.

And the part has one wall section of only .027".

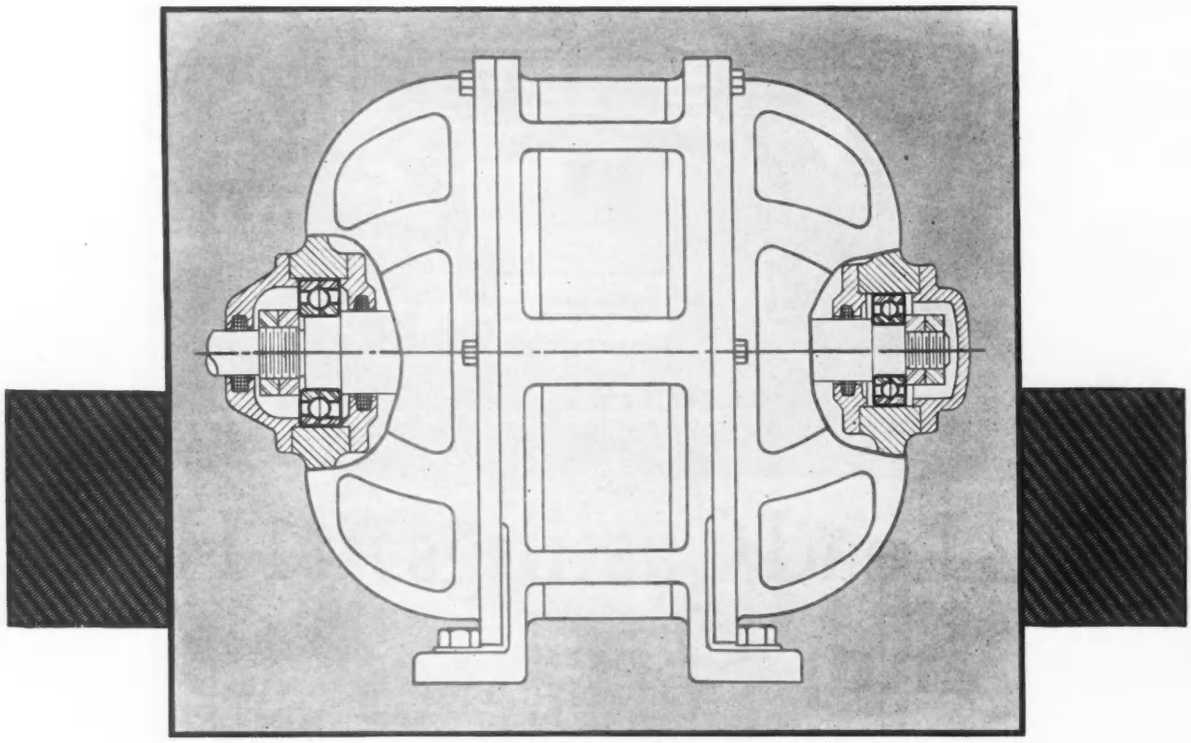
Automatic Dies are only one of the features that make Madison-Kipp Die Casting Machines fully-automatic modern high production tools.

Madison-Kipp Machines cast zinc alloy parts even at a higher rate than shown here. There is no mystery or secrecy about Madison-Kipp methods. The factory is open to give complete demonstrations to anyone interested.

MADISON-KIPP CORPORATION
DIE CASTING DIVISION
211 WAUBESA STREET, MADISON, WISCONSIN

Manufacturers of Air Grinders, Fresh Oil Systems, Mechanical Lubricators, Die Casting Machines, Die Casting Dies

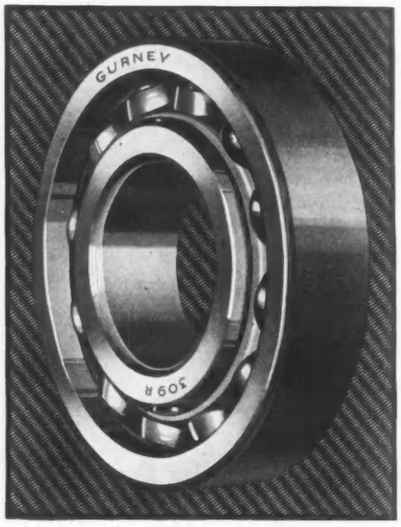
Madison-Kipp
DIE CASTING MACHINES



Gurney Ball Bearings

are capable armature supports . . . . .

Designed and constructed to sustain both radial and thrust loads, they permit motors to be mounted in any position. Gurney Ball Bearings are practically wear-proof, insuring a continuity of service unbroken by need of repair or adjustment. Particulars gladly furnished by our Engineering Department.



GURNEY
BALL BEARING DIVISION

MARLIN-ROCKWELL CORP. - JAMESTOWN, N. Y.

GURNEY BALL BEARINGS

NOW!!

MORE THAN EVER BEFORE

INSIST ON ~

Die Castings

—for greater ultimate manufacturing economies!

THE NEWTON DIE CASTING CORPN.
146 Munson Street New Haven, Conn.

Tomorrow's Profits will come from Today's Efforts to make things better.

NDC-24

The CO-
in
OPERATION

EACH HEATING device you make represents a very definite cooperation between you and *some other company.*

That *some other company* (the manufacturer of the heating element material) ought to be known to you. It is really your partner.

Nichrome IV
High Temperature Service

The Company behind "Nichrome"...

DRIVER-HARRIS Laboratory control over ALL elements entering into the making of "Nichrome" IV has assured the manufacturer of heating devices a resistance with Controlled Uniformity . . . this is your guarantee.

DRIVER-HARRIS COMPANY
HARRISON, NEW JERSEY

Chicago-Detroit-Morristown, N. J. England-France
In Canada The B. Greening Wire Co., Ltd., Hamilton

DURABILITY ▼ ▼ ▼

Plus Appearance

Two consistent results of the STEWART die-casting process ▼ ▼

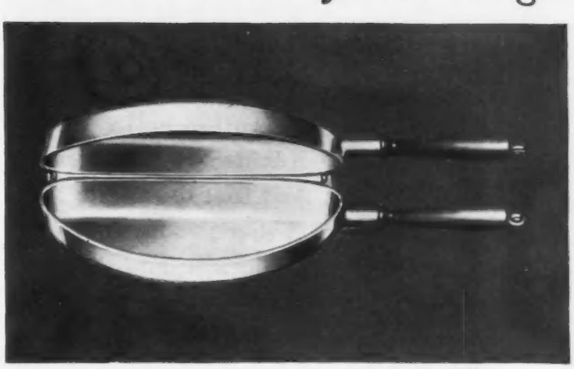
THIS every-day household equipment possesses not only greater quality as a result of the Stewart process, but is placed within the price-range of a greater number of people.

Aluminum utensils, once sand cast, now receive smooth perfection of finish and other detail advantages of the Stewart die-casting process. As a result machining and handling expenditures are practically eliminated and unit costs measurably reduced.

Thus, by adapting aluminum ware to the die-casting process, Stewart has not only reduced its cost, but given it greater durability and finer appearance as well.

A Stewart engineer will be glad to call and talk over your requirements with you, or we will submit definite information upon receipt of blue-prints or samples of your present production.

Stewart gives aluminum ware *new beauty and strength*



Detroit
Pittsburgh
Dayton
St. Louis
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Stewart

THE STEWART DIE-CASTING CORPORATION
4500 Fullerton Avenue, Chicago, Illinois

Our new "Engineer's Die Casting Handbook" is now ready. It contains a brief, factual description of the die casting process in all of its modern developments. Write for your copy today.

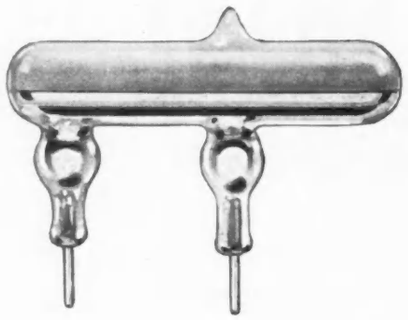
There are millions of makes and breaks in the sturdy little KON-NEC-TOR

In a growing list of more than a quarter of a million installations the sturdy little mercury switch, the Kon-nec-tor, has proved its reliability and efficiency. It makes millions of makes and breaks of a circuit at rated capacity without a failure—and makes them, roughly, up to 100 a minute.

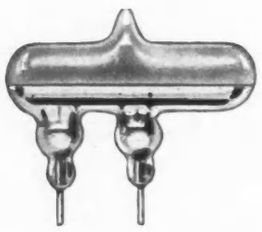
Extreme simplicity of construction and operation accounts for the long and dependable service the Kon-nec-tor gives. Enclosed in a hard, shock-resistant glass tube is a small pool of mercury which unites and separates as the Kon-nec-tor is given its slight rocking motion in operation. Two tungsten in-leads are sealed in the glass between the outside leads and the mercury. The glass tube is filled with an inert gas which dissipates heat. Since there's no open arc, the Kon-nec-tor eliminates fire hazard.

And the Kon-nec-tor has almost limitless uses. Among them may be mentioned the following:

Electric ranges, alarm equipment, coin operated cameras, games and vending machines; dental and medical equipment; electric water heaters; pyrometer control; news and stock quotation machines, refrigeration and cooling equipment, relays, push button remote control switch; time controls, float controls; toggle and tumbler switches; sign flashers; traffic controls; elevator limit and safety devices; flashing beacons, etc., etc. For types, sizes, ratings, etc., write for Bulletin 601. General Electric Vapor Lamp Co., 883 Adams Street, Hoboken, N. J.



Kon-nec-tor 7-10 KRO (Unmounted, actual size) designed for currents as high as 25 amperes, voltages up to 250, total wattage capacity 2400, non-inductive load.



Kon-nec-tor 4-21 KRO (Unmounted, actual size) designed for currents up to 15 amperes, voltages up to 250, total wattage capacity 1200, non-inductive load.

Join us in the General Electric Hour, broadcast every Saturday evening, on a nation-wide N. B. C. network

GENERAL ELECTRIC VAPOR LAMP COMPANY

(Formerly Cooper Hewitt Electric Company)

463 © G. E. V. L. Co., 1930

District Offices

Boston, Mass.: 250 Stuart St.
Charlotte, N. C.: 200 S. Tryon St.
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San Francisco, Calif.: Keese Eng. Co., 557 Market St.
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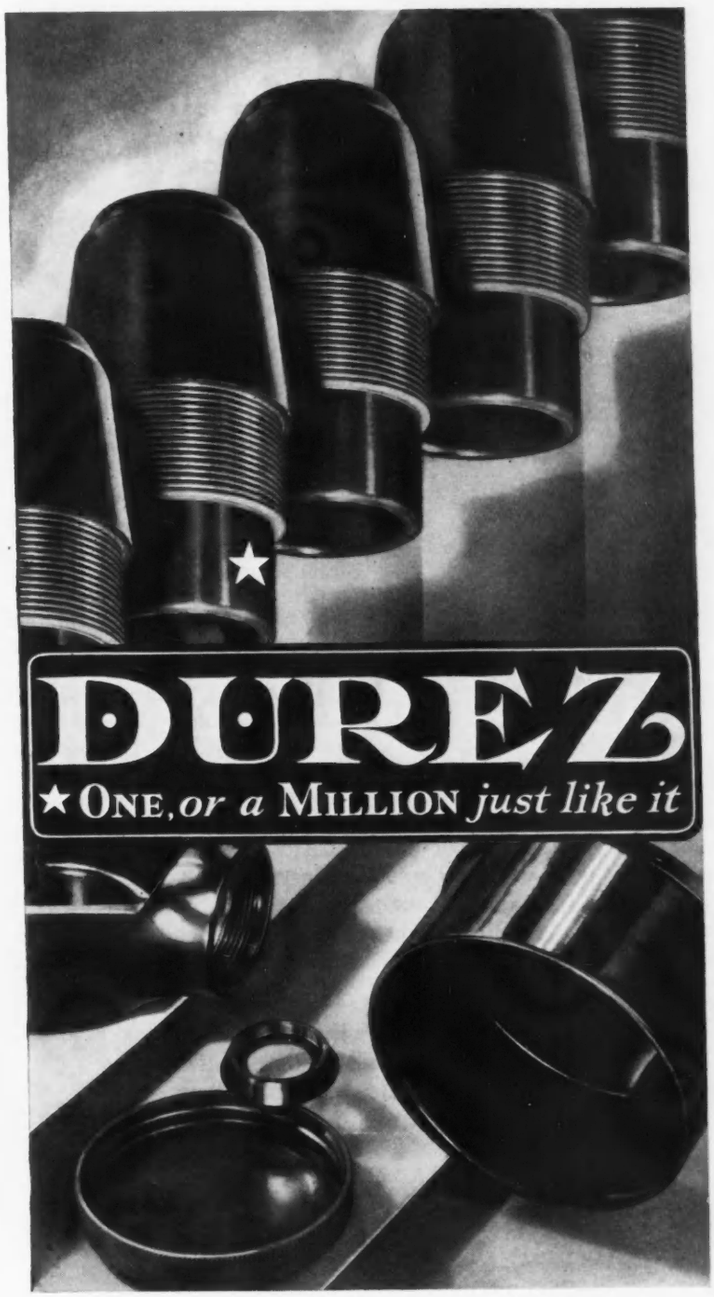
You know the quality of threads you want

. . . let DUREZ produce them for you



YOU'RE FAMILIAR with Durez because you've seen some of its countless uses. Perhaps you don't realize that many manufacturers have chosen this molding compound for just one reason. It insures perfect threads!

And that applies to any kind or size of thread! Whether you require very fine threads . . . short bayonet threads for readily removed box covers . . . sturdy threading of insulated parts . . . wear-resisting threads on jar tops, bottles and collapsible tubes—*wherever* you use it, Durez assures accuracy within the closest commercial limits.

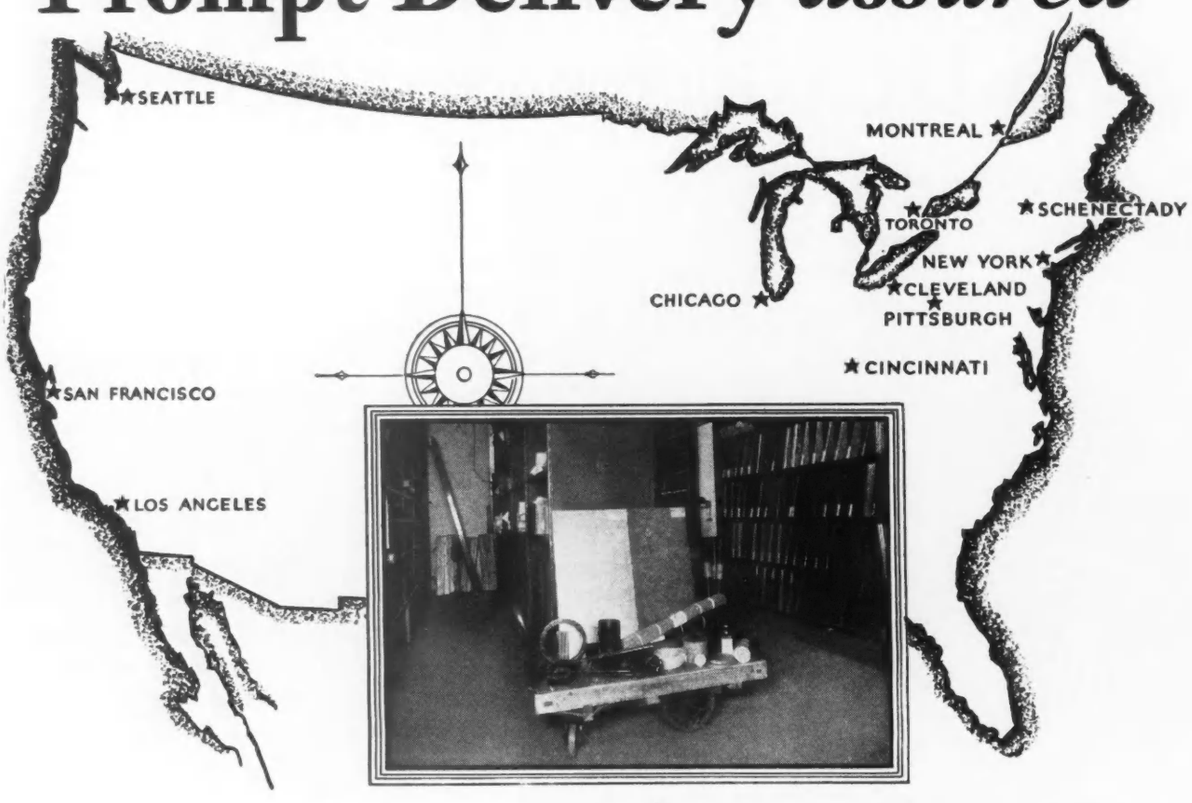
Durez threads are molded, not cut—though they can be drilled or tapped without splitting or chipping. That means exact duplication whether you produce one or a million parts. Durez is hard, strong, tough. That means threads will not strip. They'll fit tightly. Seat easily. Reseal without jamming. Contents of the container will not cake, leak or discolor.

Durez has other advantages. Production is economical, for parts come from the mold *finished!* . . . quickly and easily fused. Durez is acid and alkaline resistant. Moisture, heat, gas, oil resistant. And Durez comes in all practical colors and combinations.

No matter what material you're using now, you owe it to yourself to learn more about Durez. It makes perfect threads, yes. But it will do more than that. Durez makes a perfect part—from the standpoints of efficiency, beauty and durability! We're sure of that. We'd like to tell you why. Write to General Plastics, Inc., 99 E. Walck Road, North Tonawanda, N. Y. Also New York, Chicago, Los Angeles, San Francisco.

Write for this new, free booklet, "Do It With Durez." Illustrated, it contains complete information about Durez . . . physical and dielectric properties, color ranges, and scores of possible applications.

Prompt Delivery *assured*



from these stocks of electrical insulation

Super-Micanite and Micanite for commutators, slots, rheostats and similar insulating needs! Empire Varnished Insulating Materials for motors, coils, cable joints, etc.! They are carried in stock in the cities starred on the above map.

Our representatives in these cities are at your service to help assure the prompt delivery for which the Mica Insulator Company is noted. Their knowledge of the characteristics and successful application of these insulations is yours to use at any time.

MICA INSULATOR COMPANY

New York: 200 Varick St. Chicago: 542 So. Dearborn St.

Cleveland Pittsburgh Cincinnati Birmingham Seattle San Francisco
Los Angeles Toronto Montreal *Works:* Schenectady, N. Y. London, Eng.

PERFECT MICANITE INSULATOR REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR REG. U.S. PAT. OFF

MICA INSULATION OILED CLOTH INSULATION

"WHAT IF IT IS A FISH STORY?"

* * *

EVENTUALLY people will BELIEVE it!

* * *

Years ago when the writer was a young lad living in a country town he used to hang out at the village "smoke house." Each night all the champions of the town came to this cigar store...checker champions, cribbage champions, champion story tellers, even champion liars.

One night, one of the latter joined in a conversation that had drifted to hunting. Years before, he said, he had started out with his trusty rifle slung over his shoulder, ready for a little first-class sport.

Proceeding to his favorite hunting grounds, located on the bank of a small stream, he had waded across the water and was climbing up the farther bank when to the right of him he saw three fat pheasants. Quickly he took aim and was just about to pull the trigger . . . a sound on his left diverted his attention. Turning, he saw a flock of quail, repointed his gun and, for the second time, prepared to pull the trigger . . . up from the bushes in front of him rose the largest bear he had ever seen!

Pheasants to the right of him, quail

to the left of him, and a big bear in front of him! He aimed again, this time at old Bruin, and let go BOTH barrels! With a loud report the gun

exploded, the bear feil dead, the hunter . . . but let him tell the climax:

"Well, sir, the shot from both barrels went forward and killed the bear. The gun exploded . . . the right hand barrel flew off and killed the pheasants, the left hand barrel killed the quail. The gun kicked me into the stream and when I crawled out my boots were full of FISH!"

The old fellow *believed* it, too, because he had told it so often! And there is the moral of our tale. Tell a thing often enough and, like the hunter, you will believe it!

Watch out for guys who tell you business is awful. Their fish stories are exaggerated. It really isn't as bad as they make it out to be. It's just as easy to say business is great . . . even if you have to lie to do so. After all, like the old squire, if you say it often enough you'll believe it—and so will everyone else—and then, it *will* be great! Now, all together!

BUSINESS IS GREAT!

From 'another angle

People get ideas. And ideas become habits. And habits become so strong that we cannot break them.

More than fifty years ago the Egyptian Lacquer Manufacturing Company acquired the habit of solving difficult finishing problems. We *can't* break the habit, now.

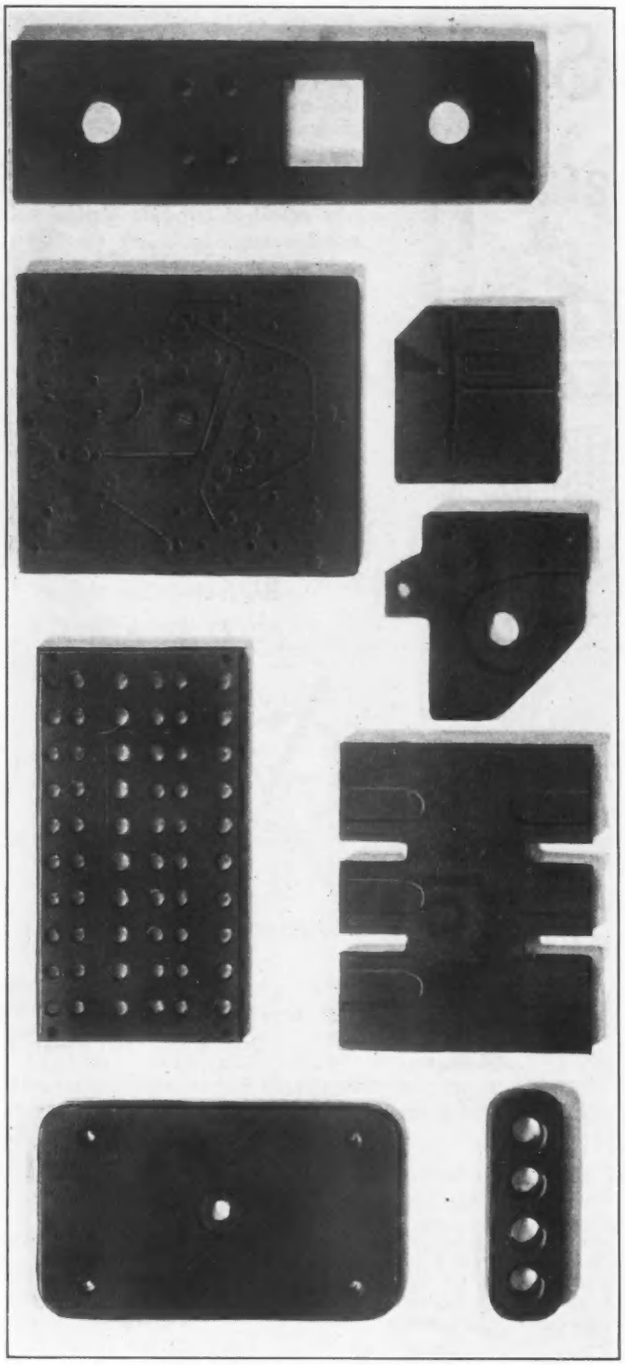
While there is an Egyptian lacquer made for every job, every once in a while some client will present us with a special problem. But the solution IS found...sometimes easily...sometimes only after arduous research.

THE EGYPTIAN LACQUER MFG. CO., 90 WEST ST., NEW YORK CITY

Branches in charge of practical men *maintained in*

ATLANTA BOSTON BUFFALO CHICAGO CINCINNATI CLEVELAND DALLAS DETROIT KANSAS CITY LOS ANGELES PHILADELPHIA PORTLAND, ORE. SAN FRANCISCO SEATTLE SPOKANE ST. LOUIS

The Maker Who is Proud of What He Makes Uses Egyptian Lacquer



WHAT IS YOUR MOULDED PROBLEM?

Perhaps Ambler Asbestos Cold Moulded Products Will Solve It!

Three Types of Cold Moulded Asbestos are manufactured by Ambler, each with certain distinct properties to fill varied requirements of electrical manufacturers. The examples pictured here are Ambler Moulded Ebonized Asbestos. Moulds are made in our own shops.

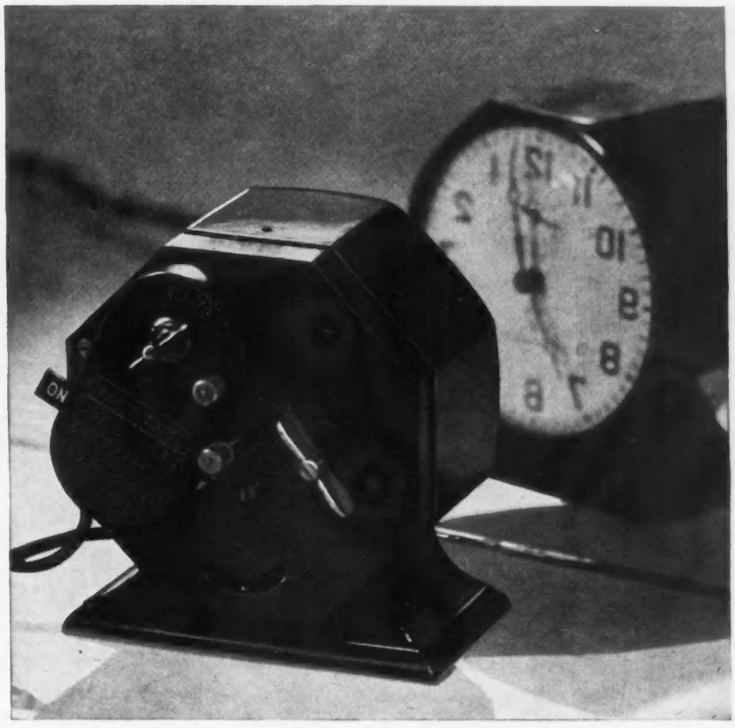
Write for Electrical Catalog.

Ambler Asbestos Shingle & Sheathing Company

Ambler, Penna. **St. Louis, Mo.**

Manufacturers of

AMBLER-EBONIZED-ASBESTOS



Switchman Clock with base and back of Bakelite Molded. Made by R.V. Mfg. Co., Marshfield, Mass.

ONE OPERATION FORMS AND FINISHES EACH CLOCK CASE PART

To produce an electric time switch clock at a reasonable cost, requires that every manufacturing and assembly operation be made as simple as possible. An excellent example of this economical production is provided by the three Bakelite Molded parts of "Switchman" clock. The octagonal back, which also serves as the insulation base for the electrical parts, is formed of Bakelite Molded in one operation, with the required holes for screws and keys. A second operation forms the oval switch block, and a third the stand, or base. Each of these parts leaves the mold complete, with a lustrous finish that needs neither polishing nor plating.

Bakelite Molded is a most practical material for the production of electrical instrument cases of various kinds and sizes. It possesses excellent insulating properties, and is strong and durable. The lustrous finish is enduring and is acquired in the mold. Any required lettering or marking may be formed in the mold, and metal inserts may be embedded. It is likely that this material may be used to advantage in your own products.

Bakelite Engineering Service—We manufacture a wide variety of Bakelite resinoid molding materials, varnishes, lacquers, enamels, cements, and other products. Twenty years experience in the development of these materials for electrical and other uses, provides a valuable background for the cooperation offered by our engineers and laboratories. Write for Booklet 52M, "Bakelite Molded".

BAKELITE CORPORATION, 247 Park Avenue, New York. CHICAGO OFFICE, 635 West Twenty-second Street

BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario

BAKELITE

REGISTERED U. S. PAT. OFF.

"The registered Trade Mark and Symbol shown may be used only on products made from materials manufactured by Bakelite Corporation. Under the copyright "B" is the numerical sign for infinity, or unlimited quantity. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products."

THE MATERIAL OF A THOUSAND USES

SPAULDING-BAKELITE TUBING

A new and better ROLLED BAKELITE TUBE

All the Advantages of Molded Tubes with None of the Disadvantages . . .

SUPERIOR to any phenolic tubing you have ever used. Has every important quality of molded tubing—low moisture absorption—rigidity—electrical qualities—but is tougher and less fragile. Runs more concentric than molded tubing, giving more uniform wall thickness.

Rolled into one dense, homogeneous structure that is resistant to chipping, bending and breaking. No seams or irregularities as in molded tubing to reduce its insulating efficiency or to crack open in service. Retains its shape under normal stress and pressure.

It threads nicely because there is no seam as in molded tubing. Threads cannot be stripped off with thumb as in the case of ordinary grades of rolled tubing.

Spaulding-Bakelite Tubing shows lower moisture absorption than heretofore obtainable in combination with its other desirable properties.

Replace less efficient tubing with Spaulding-Bakelite Tubing. Send for samples and prices.

Ordinary Rolled Tubing

Ordinary Tubing when cut with knife shows separation of the plies. This means reduced density, higher moisture absorption, lower mechanical strength and weak threads that strip easily.

Spaulding Tubing

Spaulding Tubing when cut with a knife shows no separation of the plies. Its layers are fused into a solid mass. This means low water absorption, strong threads and greater electrical strength.

SPAULDING FIBRE COMPANY, INC.

TONAWANDA, NEW YORK

Branch Factories Completely Equipped and Stock in . . .

New York, N. Y. Chicago, Ill. Boston, Mass. Cleveland, Ohio Milwaukee, Wis.
Philadelphia, Pa. Cincinnati, Ohio Los Angeles, Cal Detroit, Mich.
St. Louis, Mo . San Francisco, Cal.

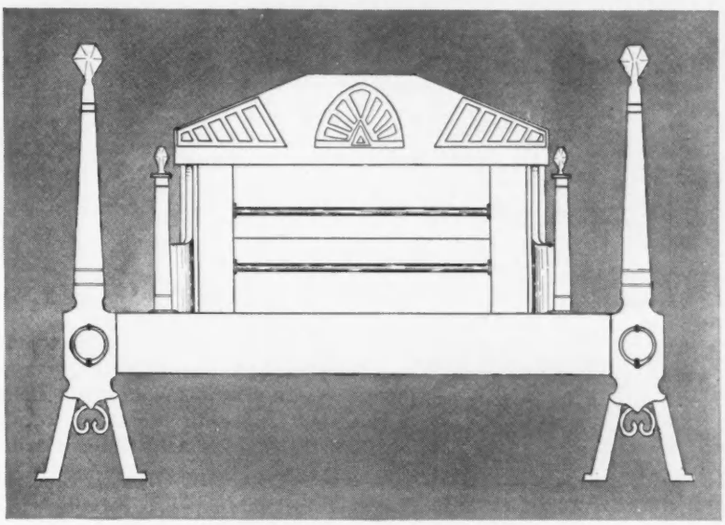
Spaulding

FIBRE (GENUINE HARD VULCANIZED)
BAKELITE (LAMINATED)
ARMITE (THE IDEAL THIN INSULATION)

AGAIN Globar BRAND ELECTRIC HEATING ELEMENTS

REG. U.S. PAT. OFF.

are called upon to solve a manufacturer's problem



THE manufacturer wanted to convert a fireplace unit from gas to electricity, still maintaining its pleasing design, making certain an added heating efficiency—keeping manufacturing costs in line with the old unit.

Globar engineers redesigned the device—equipped it with Globar Brand Electric Heating Elements—and the problem was solved.

The result, as the sketch indicates, was a design of pleasing appearance—but what the sketch doesn't show is its remarkable heating efficiency and low cost of production.

The unit will operate on 110 or 120-volt circuits—2000 or 3000-watt capacity with a three-heat control.

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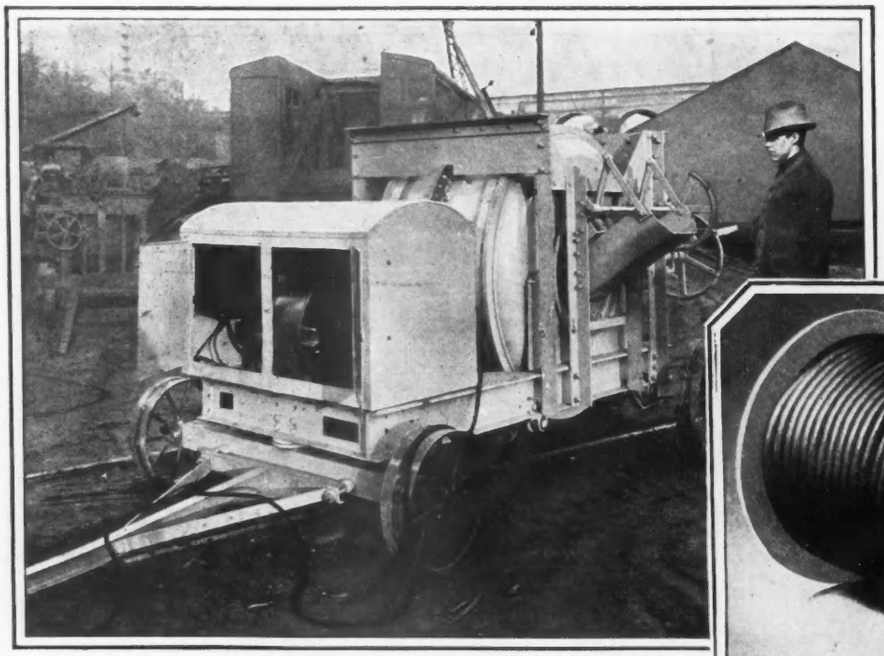

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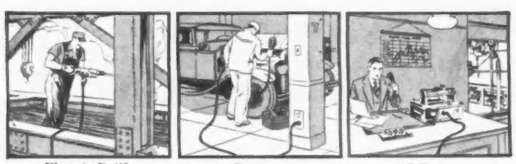

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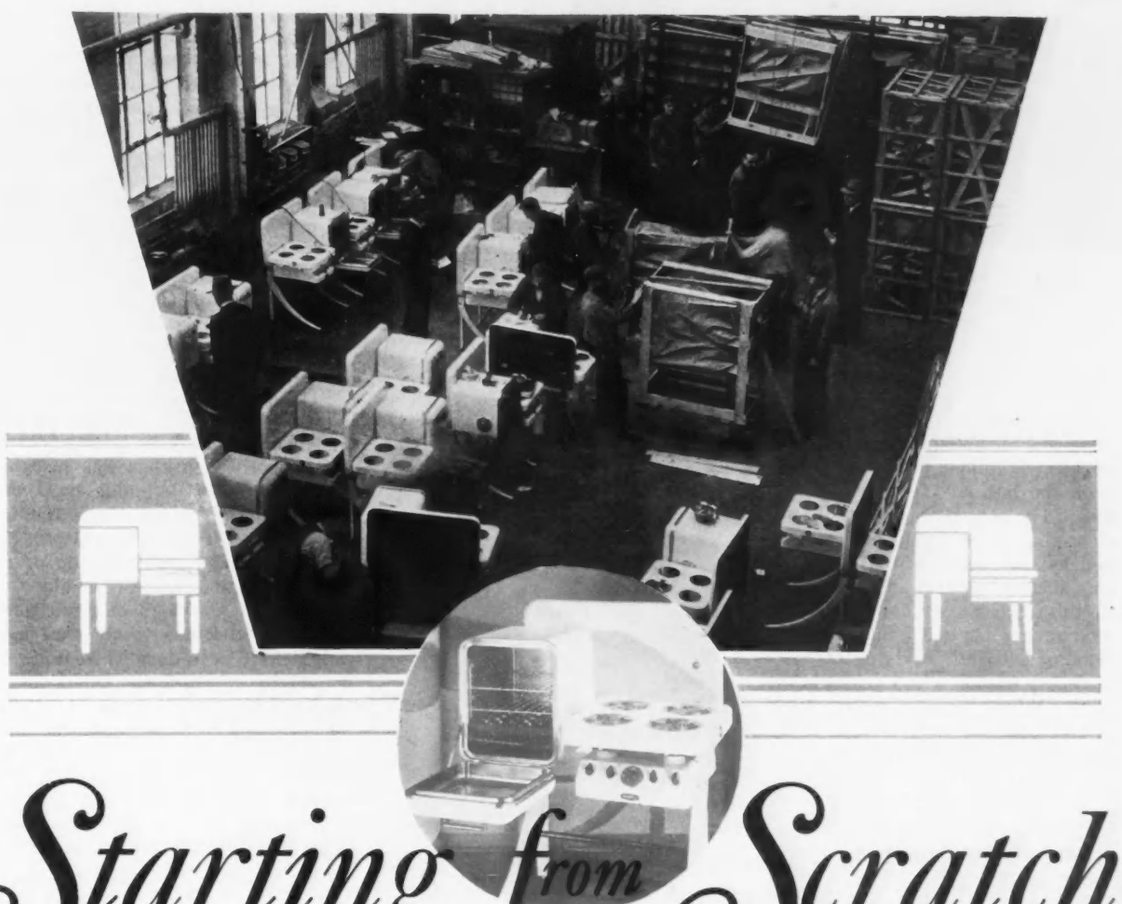


Starting from Scratch

with a Design and Manufacturing Program

By Leon I. Thomas
Editor,
Electrical Manufacturing

IF the manufacturer behind this story had kept a diary, this is how a certain entry of a year or two ago would have read:

"Where do we go from here? The product is an electric range. We haven't any plant in which to make it. We have no organization of any kind. We do not have even a design. The engineers chosen to direct this project do not come from the electrical manufacturing field. They come from the automotive field.

"But we do have some ideas, and certain very definite objectives. We have plenty of the experience in mass production so common in the automobile field. We have ample capital for carrying on our enterprise.

"Now here is a chance to see what can be done in a fertile field, in which we work from a fresh viewpoint, one unhampered by electrical tradition. It's a veritable chance to start from scratch."

It must be a lot of fun to start a business from scratch as Electromaster Incorporated did in 1928 and pull it up to a daily output of 80 new type electric ranges. It is, the officials who had been through it told me, but not all fun. There were plenty of times when the drain on the large supply of patience was considerable. But that's getting along too fast with the story. Let's begin at the very

AN Electrochef oven receives one of its two coats of white enamel. From here the part goes to the ovens for baking

beginning and tell it consecutively.

In the first place, you will inquire, Why start from scratch anyhow? Why not use the accumulated experience of other electric range people who have been in the business for a number of years? The answer is that it was thought that more would be lost than gained by such a procedure.

This answer requires an explanation. It is this: the recent annual sale of electric ranges has been in the neighborhood of 140,000. And yet there are some twenty million wired homes in the country. When you consider these facts and bear in mind the relatively enormous sales of electric refrigerators and washing machines it becomes evident that here is a situation worth searching into.

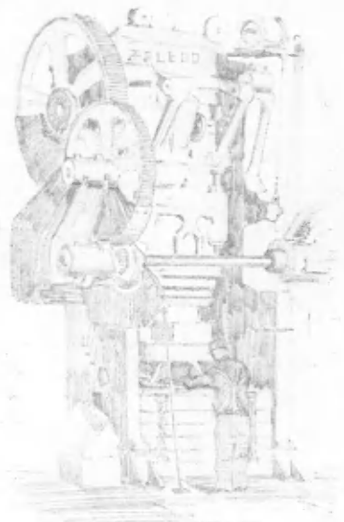
To many it seemed a fair assumption that initial cost and operation expense were the chief reasons for the lag in range sales. Nor did the cost of current present a major obstacle insofar as was concerned the wattage necessary to produce theoretically the proper number of heat units in the heating element to effect cooking. But the trouble was that you had such a mass of material—of metal, refractory, heat insulation materials and so on—to heat up before you began cooking, that the cost of total electrical energy consumed mounted to such a figure as to make the range, in the eyes of many, outside the competitive class with other fuels for cooking.

Fully appreciative of this situation Alex Dow, president of the Detroit Edison Company, and others maintained that in order fully to develop domestic electric cooking, a fast range at a price within reach of the average income is essential. When it seemed to be true that the then existing range manufacturers were not inclined at the time to undertake the task of development of such a range some of the officials of the Detroit Edison Company decided to cast precedent aside and to authorize independent, competent production engineers in Detroit to do the job.

Besides embodying departures from accepted ideas of electric range design it was the plan to create a design which might be executed by mass production methods, with punch press and automatic machinery so that costs might be held low. This task was intrusted to Warren Noble of the consulting production engineering concern of Noble & Harris, who had had a wide experience in the automotive industry—an industry noted for willingness to forget preconceived ideas and depart from hampering tradition. Furthermore they were accustomed not merely to *building* things but to *manufacturing* them on a quantity production basis.

So much for the set-up. Now what of the immediate problems of design involved? Obviously at the start of the task was the problem of designing a heating unit that would be not only inexpensive but which would have as little mass to be heated up as possible and be readily replaceable. The open type coil with a satisfactory reflecting means for concentrating the heat where needed seemed ideal.

Such heating coils and their supporting refractory were easy to design to meet the requirements of little mass and large heat producing power, but the reflector presented quite another problem. The trouble encountered here was that the usual materials used in making reflectors would tarnish almost immediately under the severe heat conditions and it was asking too much to expect the housewife to do the arduous polishing necessary to keep the ordinary reflectors up to efficient reflecting condition.



The problem being thus closely tied down, all attention was focussed upon it. Now chromium plating came to the rescue. Here then was an example of the need for designing engineers to keep constantly in touch with the latest in the way of available materials and processes and take advantage of them wherever and whenever possible. Had this particular design of electric range been undertaken several years ago it might have been doomed to failure. It would have been ahead of its time because there would not have been available the materials to make the design work out in practice, for chromium plating is a comparatively recent development.

But even here it was not a case of designing a reflector and merely chromium plating it by regular commer-

" . . . a heating unit that would be not only inexpensive but which would have as little mass to be heated up as possible and be readily replaceable. . . ."

cial methods. It was not as simple as that. And for this reason. The chromium plate so extensively used in automotive and similar work is very thin. Furthermore the chromium coating is not a continuous film and under the extreme conditions of this range design problem oxidation soon took place through the noncontinuous coating into the nickel layer usually placed on the steel shell as a preliminary plating.

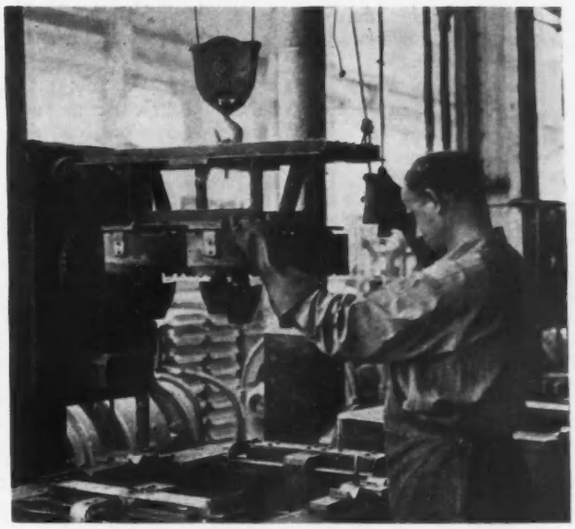
Here then was a major problem. The end desired was clear enough and the desired attainment seemed such a little distance from existing accomplishment. But many weary hours of patient experiment passed before this gap was bridged and a satisfactory heavy coating of chromium was electrolytically deposited directly upon the steel. But it was finally accomplished.

Furthermore the cost of the operation, as finally worked out, was low and of such a nature that the plating unit could be placed exactly where wanted in an efficient production line, thus eliminating extra handling, back-tracking and so on.

With this major problem solved the rest of the design and quantity production program was relatively simple, although it required a continuing willingness to abandon conventional features of electric range production. It is not intended to convey the idea that from here on there were no problems, for in reality there were many indeed.

For instance, it was one thing to make satisfactory welds in the experimental room but quite another to design methods for making them in commercial production so that they would stand up uniformly under rigid inspection. Similarly there was the matter of allowing for expansion due to heat, and a hundred other things. So much for the heating units for cooking food in containers placed upon them but that in itself, while it may involve the essentials of an electric stove, does not constitute all there is to a complete electric range. There is the oven to consider.

Here, as in the case of the other heating units, was the same elementary requirement—quick heating and in addition good oven insulation. This problem involved the same factors as before—a small mass of oven material to be heated up—and strangely enough the same key, chromium plate, unlocked this problem too.



REMOVAL by electric hoist of anode from electric plating tank which chromium plates four cooking-table reflectors at one time

" . . . Instead of the usual heat-insulating jacket of rock wool, a double air chamber surrounding the entire oven volume is employed. . ."

The heater here is of nickel-chromium open coils, as readily removable and renewable as in the case of the plate units, and the reflecting power of polished chromium plate is utilized within the oven walls. Furthermore, instead of the usual heat-insulating jacket of rock wool and similar materials a double air chamber surrounding the entire oven volume is employed—again a minimum mass of material to be heated before baking itself may proceed.

Thus was obtained an equivalent heat insulation to the conventional oven but with this highly important difference—the oven gets up to baking heat in about one-sixth the time with the air space insulation.

Another ingenious idea is the placing of the oven heating unit in the middle of the oven so as to provide broiling space below and baking space above—all in the same single heat insulated compartment. Again a departure from tradition.

Even in the design of the supporting legs there was a fearless breaking of tradition, which said in a matter-of-course way that naturally you would want four more or less vertical legs—one for each corner. But why? It was quite proper to ask "why" in this case, for the oven being rounded at corners and edges, because of ease of cleaning, simplicity of vitreous enameling and efficiency of heat insulation made it inconvenient to put vertical legs in the extreme corners in traditional fashion.

So the leg arrangement shown in an accompanying illustration was worked out as meeting all the structural needs of support and allowing of a minimum number of parts.

The design problems being solved, trial production was undertaken, and then after all the resulting wrinkles of this were ironed out real commercial production was laid out. And even the plant itself is unorthodox. The building which houses 80-range-a-day production activity is an old shipbuilding plant. It is admirably adapted to the needs of the company for the high ceilings readily accom-

modate even the high presses required for forming the oven units and for a unique overhead conveyor which encircles the plant.

As was said at the outset, the desire was not merely to produce an entirely satisfactory electric range but to do so under highly efficient mass production conditions. So plant layout came in for major consideration. This enabled operations to be arranged in proper sequence to eliminate waste "mileage" between raw material and shipping platform.

One large factor in accomplishing this with a minimum of physical effort on the part of the employees was the installation of the overhead conveyor already mentioned. This is a chain conveyor from which the oven shells and other stampings are suspended. In this manner they go from the original operation right through to the plating and the enameling.

This is an endless conveyor completely encircling the departments involving these steel parts and performs the double function of conveying and storage. Thus there is no needless picking up and putting down and no chance for certain parts to go milling around in a sort of little eddy as sometimes happens in production work, which inevitably causes temporary side-tracking and subsequent complaints of delayed shipments.

In other words, work in production is always on the move and not standing around in idle piles.

An Interesting Conveyor Installation

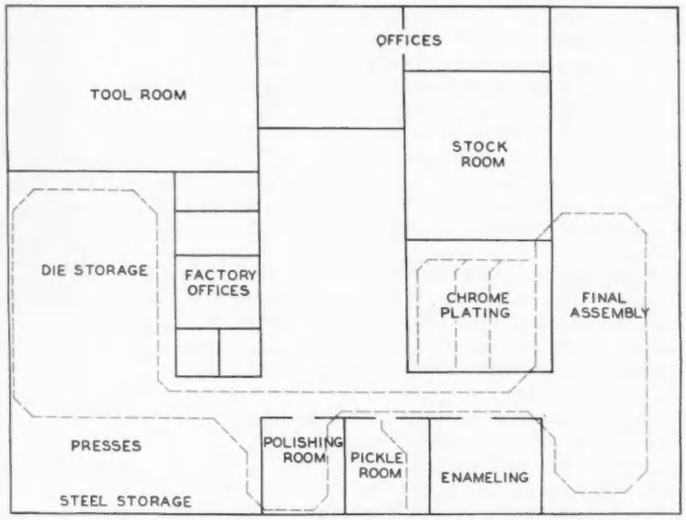
The ground covered by this conveyor is shown in the accompanying sketch. The movement of the entire conveyor is controlled from any one of four points: (1) at the press department; (2) in the enameling department; (3) plating department, and (4) final assembly. This makes for great flexibility.

The huge press, which shapes the ovens after the blanks are cut from large sheets, is located adjacent to the annealing furnace, so here it is a matter merely of passing the part from one of these pieces of equipment directly to the other. This is typical of the care which has been shown in the locating of machinery and processes throughout the plant to obviate needless handling.

Incidentally there is some clever designing of the dies so that in some cases two parts are formed in the operation of making a single piece. Thus the oven door frame and the inside shell of the oven are made in a single die and then the resulting product of the press cut in two to form both of these parts.

Progressive assembly prevails throughout the plant wherever good production management seems to dictate such a procedure. Notably this is the case in the department which does the assembling of the thermostats which are used in the ovens.

HUGE presses form the oven shells. Partially formed ovens pass through the huge annealing furnace at the right on a conveyor



AN endless conveyor (follow the dotted line) completely encircles the departments involving stamped parts. Oven shells and other stampings are suspended from the original operation right through to the plating and enameling

Small Assembly Is Done in the Gallery

The building which houses the manufacturing has a gallery and it is here that are concentrated the assembly operations on the smaller units which go to make up the entire range.

Another example of mass production as against the "job" method of turning out a product is in the measuring off of resistance wire for use on the conical heater elements. Enough wire is wound up in spiral form to produce eight units at a time. This is measured as to its total resistance and then the Wheatstone bridge method is used to indicate where the cut is to be made for each unit—considerably faster and fully as accurate as by individual measurement. This is in itself a comparatively unimportant thing, but it is indicative of mass methods which prevail throughout this plant.

Another interesting bit of procedure from an internal management viewpoint is the plan followed as regards crating of the ranges for shipment. The production department's duties are considered to end with the standard crating of the range. If the product is to be exported the extra packing that has to be done to withstand the ocean voyage is a function of the sales department and not of the production people.

Interesting as this plant is from a purely production angle it is doubly so when you take into account the fact that the whole thing—product design, plant selection and layout, equipment and production planning—started from scratch, and only twenty-four months ago at that!

"Kitchen Mechanic"—Clothes Washer

It's the Same Motor

HERE is a product that was originally designed for a one-eighth horsepower motor, but was re-designed for a one-sixth horsepower washing machine motor so as to take advantage of the lower price due to large-scale production

By ROGER L. KNIGHT
Associate Editor, ELECTRICAL MANUFACTURING

AFTER the war Benjamin Gould found himself without anything in particular to do. For twenty years prior to the war he had been in the electrical appliance manufacturing game, and now he wished he could get back into it. It was the business he knew.

So Benjamin Gould scouted about to see what there was in the electrical appliance line that needed manufacturing. He found there was only one electrically driven mixing machine for home use on the market. Very well, he would manufacture a domestic type electric mixing machine.

"COMMERCIAL considerations often have more weight in determining the selection of motors than engineering considerations. Every design is a compromise between ideal engineering and low cost."—
BENJAMIN GOULD,
President, Gem Appliances, Inc.

The heart of a mixing machine is a motor, so the problem of designing a mixing machine was largely a problem of surrounding a motor with the necessary mechanisms for doing the various stirring, beating, sharpening, buffing and slicing jobs that the housewife is called upon to do in the regular routine of her daily work. A motor. But what motor? That would depend on the design of the machine.

The selection of the motor depended upon the design of the machine and the design of the machine depended upon the selection of the motor. What then?

Mr. Gould had always been intrigued by the flexible shaft principle of power transmission. His first thought in designing a small mixing machine was a machine consisting of a motor, a flexible shaft, and the necessary mixing tools.

He designed such a machine and interested a manufacturing concern in making it. It didn't go. It was built on the wrong principles. The housewife didn't like it. The shaft was cumbersome. The machine wouldn't sell.

Suppose this lesson in the selection of motors had ended right there. It would read briefly: "Such-and-such motor was applied to a household mixing machine. It was unsatisfactory in every way. Caution—Don't use such-and-such motor on a household mixing machine."

But wait. Mr. Gould took exactly the same motor and built it into a highly successful household mixing machine. Which "harps" back to the fundamental principle that sound motor selection depends upon sound engineering of the whole product.

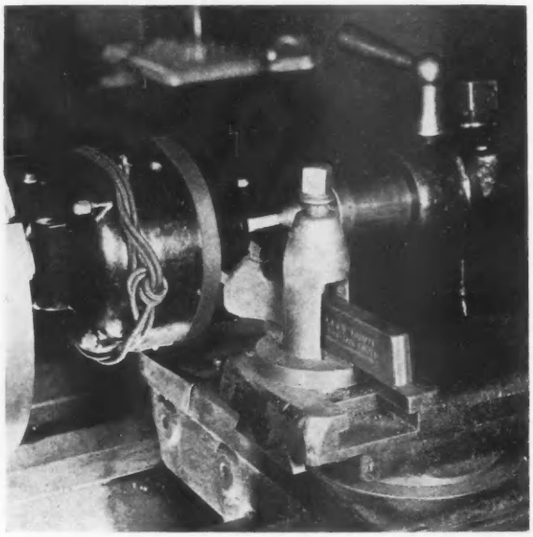
Mr. Gould concluded that his flexible shaft mixing machine was all wrong. The shaft principle was wrong because the motor characteristics were such that it slowed down and stopped under load. When a larger motor was tried, the flexible shaft tied itself in a knot. A shaft heavy enough to carry the load was prohibitively heavy. The elements necessary for a successful design would not balance.

So Mr. Gould built the same motor into a geared unit and tried a large number of experiments with the machine to determine correct gear ratios for various applications. He found that two different speeds were enough to do all the tasks that such a machine would be called upon to do. He found also that his one-eighth horsepower motor was large

enough to carry the load applied through reduction gears.

The Gem Kitchen Mechanic was first put on the market with a one-eighth horsepower motor as the power unit. But now it is built with a one-sixth horsepower washing machine motor as the power unit. (And here is where the motor manufacturer comes into the picture.)

The latest lesson Mr. Gould learned about motor selection



was that the right motor to use in an appliance is determined not by engineering considerations alone, but by a mixture of engineering and commercial considerations. The Gem Mechanic was redesigned for a one-sixth horsepower motor because one-sixth horsepower motors can be bought at a lower price than one-eighth horsepower motors. This is true because many one-sixth horsepower motors are manufactured for every one-eighth horsepower motor that is built, and large scale production means lower price.

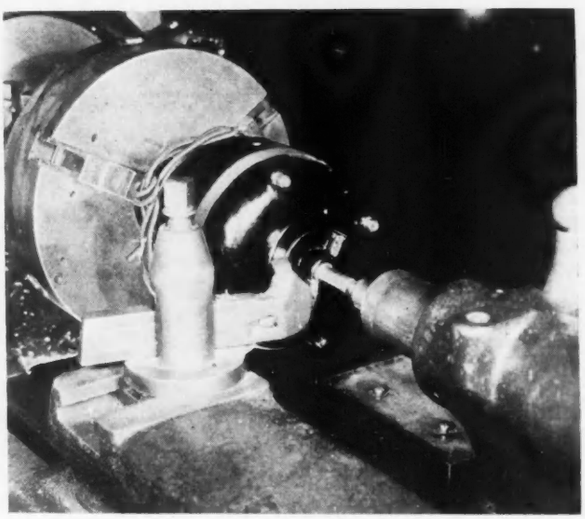
MOTORS are bought complete and are fitted to the machine housing by cutting a narrow rim around the periphery of the motor housing a few thousandths of an inch (above), and a small bit off the end of one bearing housing (right) with an ordinary lathe

Mr. Gould buys all his motors from one large manufacturer because this manufacturer makes one of the smallest one-sixth horsepower motors on the market, and this large manufacturer also has a vast merchandising organization through which the Gem Kitchen Mechanic is sold.

"It isn't necessary for us to buy our motors from more than one manufacturer," says Mr. Gould, "because the competitive price of these motors is already set by the washing machine industry."

At the time this Gem motor was selected, there were two motors, according to Mr. Gould, that from an engineering standpoint were equally suitable for this application. The motors were almost exactly the same size, and had essentially the same characteristics. One motor was manufactured by a large manufacturer and the other by a small manufacturer. At that time it was not known that the appliance was to be distributed through the merchandising organization of the large manufacturing concern. Asked why he selected the product of the large rather than the small manufacturer, Mr. Gould said, "Two things governed the selection of this motor. The first was the cooperation the large manufacturer was prepared to give us at the time we were first in the market for these motors, and the second is the widespread reputation of that manufacturer.

"If I were building special apparatus requiring the application of special motors, I should certainly buy many of these motors from small manufacturers, because they can give quicker delivery than the large ones. In our case, however, delivery is no difficult problem. We buy all the parts of our machine one hundred at a time, including the motors. By using a standard motor as we do we know that there is a large supply of these motors ready for immediate shipment if we should find ourselves in sudden need of them. Special motors present a very different problem. In that case delivery becomes one of the most important



problems rather than one of the least. Also it is usually of no particular advantage to use motors built by a manufacturer with an extensively known name. Special machines are usually built to specification, and if the machines do all the specifications call for, the buyer usually doesn't care who supplies the materials."

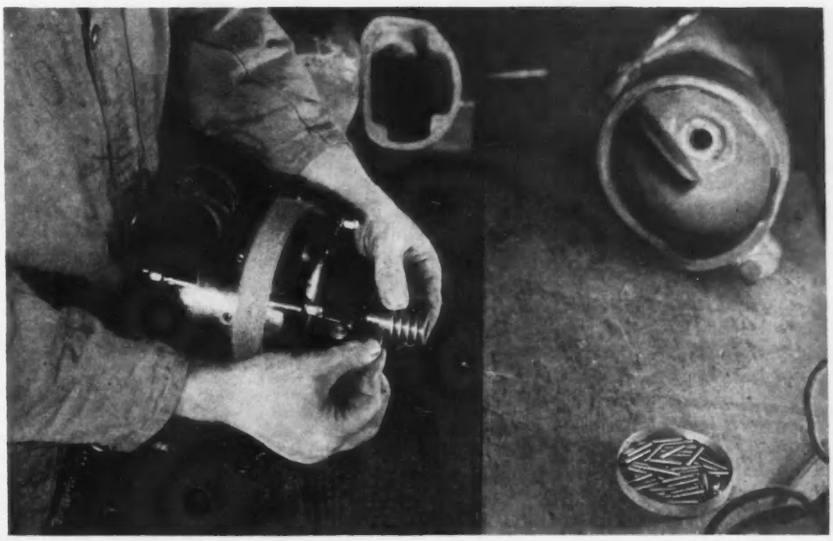
In encountering an experienced manufacturer like Mr. Gould one is curious to know just how much he thinks it is necessary to know about motors in order to make an in-

A WIDE range of power requirements are necessary for this motor. The various operations are done at one of two speeds, but these two speeds are obtained by gearing. The motor speed is constant

telligent selection. Here is his theory and practice.

"To make an intelligent selection of a motor for an assembled product, it is necessary to know almost nothing about motor design. The trouble with many manufacturers in selecting motors is that they depend entirely too much upon their own knowledge of motor design. It is necessary to know a good deal about motors, but not motor design. In designing a machine the essential part of which is a motor, it is of course necessary to know about what motors are available, what sizes they are, and about what they will do. But it is not necessary to know how the motors are designed in order to get these results.

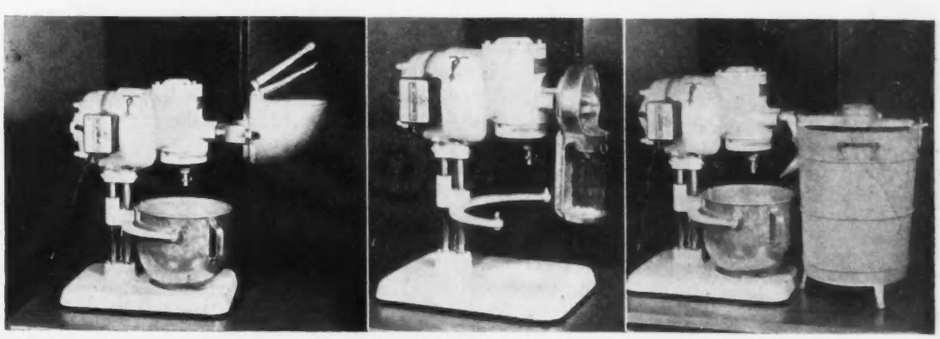
"It is foolish to specify a motor with a certain type of winding. If a machine is designed with care, the designer knows almost exactly what the motor will have to accomplish. Give the motor manufacturer data on these necessary accomplishments and he will select the motor much more intelligently than nine out of ten designers. And why not? The motor manufacturer is a specialist on motors. He has spent years getting certain *results* from motors, and the results are what the machine designer is interested in.



AFTER the motor has been machined at the periphery, it is fitted into the machine housing (left), and the worm gear is pinned on (above). The assembly operations are not actually done as shown here, but in the same order. In actual assembly the machine is assembled, then the motor and worm gear

"It is a good idea to bring in the motor manufacturer early in the design of a machine because almost always some compromises must be made with the ideal design. The Gem machine is a good example of this. Ideally, the one-eighth horsepower motor is best, but commercial considerations make the one-sixth horsepower motor preferable. Obviously, the design of the machine must be altered slightly to fit the larger motor. By bringing the motor manufacturer in early in the design, these compromises can be made on paper, which is a lot cheaper than making them later, as well as a lot better. Making compromises with deliberation early in the design stage of a machine will result in a much nearer ideal machine than making them under the stress of circumstance later."

It will be seen from the accompanying illustrations that the Gem motor is not built-to-fit, as it appears to be in the finish product. The motor is bought complete, and two simple machining operations are performed on it to make it fit the machine housing. A narrow rim around the periphery of the motor frame is removed to a depth of a few thousandths of an inch, and a little bit is taken off of one of the bearing housings. Even the screw holes used in fastening the motor to the machine housing are in the motor when it is received from the manufacturer, the machine housing being designed to make use of these holes.



THE heaviest operation required of the mixing machine is the making of ice cream. The circuit breaker switch is set so that it will turn the current off when the cream is frozen at the right consistency

Ball and Roller Bearings

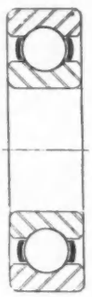
THIS is the first of two articles on the design and selection of anti-friction bearings for electrical machines. Two articles on plain bearings for electrical machines appeared under the author's signature in the July and August issues. The first of these discussed periodically lubricated bearings and the second continually lubricated bearings and bearing surfaces. This article discusses radial, thrust and angular bearings. The second article will compare friction and anti-friction bearings in their application to electrical machines

By G. A. UNGAR
Consulting Engineer

ANTI-FRICTION bearings consist of stationary and rotating raceways between which the rolling elements (balls or rollers) are interposed. The rolling elements are usually held in spaced position by means of cages or retainers, since load variations on the rolling elements produce a change in their distance owing to the effect of the elastic deformation.

For anti-friction bearings requiring besides their rotation also freedom of rolling motion in one or more directions, such as axial or radial movement or self-alignment, only balls can be employed as rolling elements in conjunction with plane, spherical or cylindrical surfaces.

However, if the bearing is required only for rotation around an axis, any rolling element will be suitable provided that all its rolling axes coincide at one point of the main axis of rotation.

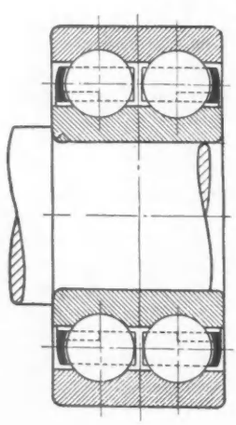


SINGLE row radial ball bearing of the deep groove type; capable of supporting radial load as well as thrust load in both directions.

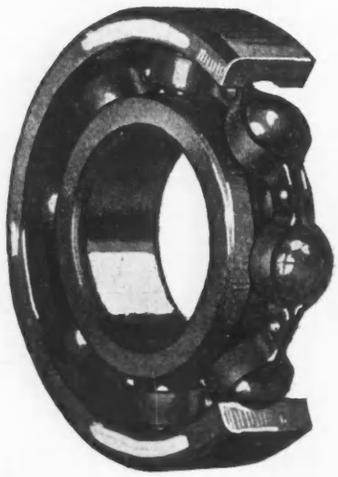
Rolling of a rolling element, such as a wheel upon a flat surface, can only take place if there is adhesive friction between wheel and surface. Should there be insufficient adhesive friction, then there will be both sliding and rolling motion.

In addition to adhesive friction there is also rolling resistance, i.e., a friction couple necessary to produce rotation with a moment $M = P f_r$. P represents the load perpendicular to the flat surface and f_r is the arm of the friction couple and is called coefficient of rolling friction. For steel balls in ball bearings f_r varies from 0.0002 in. to 0.0004 in.

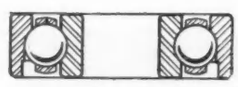
The coefficient of friction F_1 of anti-friction bearings referred to the radius of the shaft is expressed by the equation $f_1 = \frac{M}{Pr}$ where M is the friction torque of the bearing, P the total load on the bearing and r the radius of the shaft.



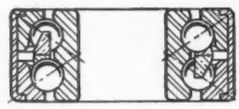
DOUBLE row radial deep groove ball bearing (above) for radial load and thrust load in both directions.



BALL retainer of a single row deep groove bearing. It consists of two steel stampings, riveted together between the ball pockets.



SINGLE row angular contact ball bearing of the separable type; capable of supporting radial load as well as a certain amount of thrust load in one direction.



DOUBLE row deep groove angular contact ball bearing. The outer ring is a composite unit of three parts.

In ball bearings f_1 is independent of the speed of rotation and the temperature within wide limits and it decreases with increasing load. In roller bearings f_1 is practically independent of the speed of rotation and it decreases with increasing temperature and increasing load.

The coefficient of friction of annular ball bearings can be taken as 0.001 to 0.002 and that of roller bearings as 0.0035 to 0.014 (Henry Hess, Transactions A.S.M.E. Volume 29).

Anti-friction bearings can be principally subdivided according to the rolling elements into (A) Ball Bearings and (B) Roller Bearings. Each group can again be subdivided according to (1) the number of rows of rolling elements, into (a) single row and (b) two or more row bearings and (2) the direction of the load. Group 2 is divided into:

(a) Radial or Annular Bearings (the load is at right angles to the bearing axis)
(b) Axial or Thrust Bearings (the load is in the direction of the bearing axis) and
(c) Angular or Combination Bearings (the load direction is at an angle to the bearing axis.)

Groups b and c have further subdivisions according to
(I) The thrust being carried in one direction or
(II) in both directions.

While in ball bearings the angle of the race contacts with the bearing axis determines the direction of the load which they will sustain, in roller bearings the direction of the load is chiefly dependent upon the type of rollers employed.

(a) Radial bearings employ Cylindrical Rollers
(b) Axial bearings employ Tapered Rollers
(c) Anglar bearings employ: (I) Tapered Rollers with Flange (on roller or raceway)

for Electrical Machines

(II) Cylindrical Rollers with Flange (on roller or raceway)

(III) Rollers with Curved Profiles (barrel or hourglass shape).

The load carrying capacity of anti-friction bearings depends primarily upon the carrying capacity of its rolling elements, which in turn depends upon the following:

(a) The material of both rolling elements and races.

(b) the diameter and number of rolling elements (with rollers also the length of the roller),

(c) the rolling velocity and

(d) the relative magnitude of the contact area between rolling elements and raceways.

These factors are embodied in the following equations based upon the investigations of Goodman (Minutes of Proceedings of the Institution of Civil Engineers, 1912).

for ball bearings

$$P = \frac{C_1 \, d^2}{\frac{n \ (D + 1)}{2000 \quad d}}$$

for roller bearings

$$P = \frac{C_2 \, dL}{\frac{n \ (D + 1)}{2000 \ d}}$$

where: P = the radial load in lbs.

d = the ball or roller diameter in inches

L = the length of the roller in inches

D = the diameter of the inner raceway in inches

n = revolutions per minute

C_1 = 2550 to 5700 for hardened and ground balls and raceways

C_2 = 11,000 (hardened and ground rollers and raceways.)

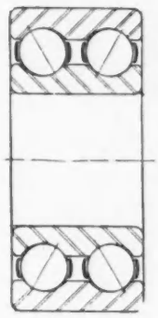
The lower value for C_1 applies to balls rolling on flat raceways, while the higher value applies to balls rolling in grooved raceways.

The above equations apply to bearings with the inner races revolving. For bearings with revolving outer raceways the r.p.m. should be corrected according to the increased rolling velocity of the rolling elements.

The load carrying capacity of axial or thrust bearings, in addition to depending upon the above factors, also presupposes equal load distribution upon all rolling elements. This necessitates special provision for self-alignment with heavier loads. The load carrying capacity of ball thrust bearings decreases rapidly with increasing speed owing to the effect of centrifugal force, causing irregular ball movement in the races and consequent sliding friction. This is particularly serious with variable load. For this reason deep groove radial or angular ball bearings and angular taper roller bearings are preferably employed to take care of thrust loads.

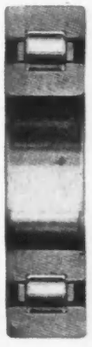
The load carrying capacities of all anti-friction bearings are affected to a marked degree by the operating temperatures above 90 deg. Fahr. The load capacities decrease in direct proportion with increasing temperature so that at 350 deg. Fahr. the load capacity is only 20 per cent of that at 90 deg. Fahr. Anti-friction bearings should never be used at temperatures where the steel is in danger of being drawn.

In view of the fact that anti-friction bearings carry highly concentrated loads upon the very small contact areas between rolling elements and raceways, it is necessary to give the greatest possible care not only to the quality and heat-treatment of the steel employed but also to the accurate finish of the operating sur-

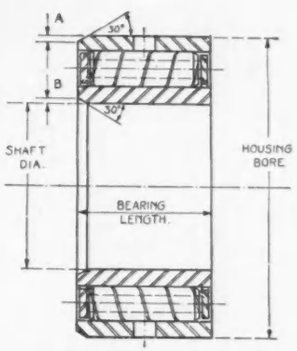


DOUBLE row deep groove angular contact ball bearing. Each ball race is a single unit. This bearing is suitable for radial and thrust load in both directions.

RADIAL cylindrical roller bearing of the open or separable type. This bearing is capable of supporting radial load only

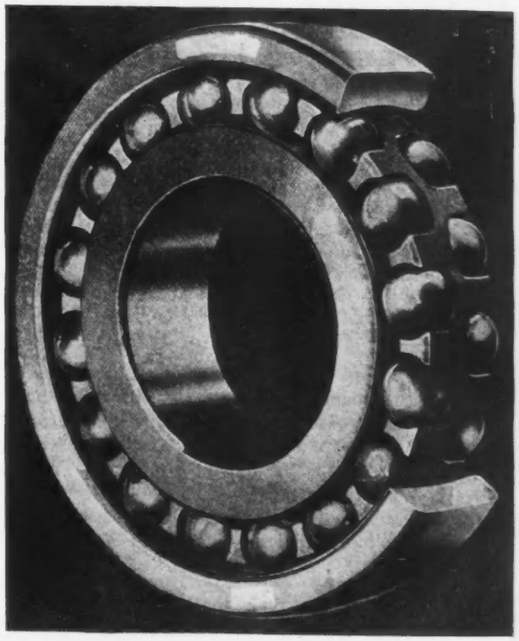


RADIAL cylindrical two-lipped roller bearing of the self-contained type; for radial load only, since the lips merely serve for locating purposes. Because of the smaller number of rollers, the load-carrying capacity is less than that of the open type bearing



RADIAL cylindrical roller bearing with flexible rollers. This bearing is used for radial load only

DOUBLE row radial ball bearing with spherical outer race. Owing to the shape of the outer race, the bearing is self-aligning. It supports radial load as well as a certain amount of thrust in both directions. Note the construction of the ball retainer

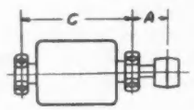


faces in order to insure operation with the least amount of frictional resistance.

The surfaces of raceways and rolling elements are therefore ground to size within less than one ten thousandths of an inch and they are subsequently polished to a mirror finish. For purposes of interchangeability of the complete bearings, the outside diameter, bore and width are also made to extremely close limits.

Ball and roller bearings are rated by their manufacturers for certain carrying capacities. These ratings are based

STANDARD BALL BEARING SIZES FOR GENERAL PURPOSE ELECTRIC MOTORS



Electric Power Club Standards			Horsepower			Recommended Annular Ball Bearings S.A.E. Standards					
						Pulley End					Other End
						Medium Series			Alternatives* Heavy Series	Alternatives* Wide Type	
Pulley Dia.	Belt Width	Shaft Ext. Diam	1750/1800	1150/1200	850/900	Pulley Overhang Ratio $\frac{C+A}{C}$			Ratio $\frac{C+A}{C}$		Ratio $\frac{C+A}{C}$
Ins.	Ins.	Ins.	R.P.M.	R.P.M.	R.P.M.	Min. 1.26	Max. 1.40	Avg. 1.33	Not to exceed 1.40		Not to exceed 1.40
3	2	$\frac{3}{4}$	1			305	305	305			303
				$\frac{3}{4}$		306	306	306			304
4	3	$\frac{7}{8}$	$1\frac{1}{2}$			305	305	305			
				1							
4	3	1	2			306	306	306			304
				$1\frac{1}{2}$							
			3			306	306	306			304
				2							
5	4	$1\frac{1}{8}$	5			307	307	307		306	305
				3							
					2						
5	4	$1\frac{1}{4}$	$7\frac{1}{2}$			308	308	308			
				5		307	308	307		307	305
					3	307	307	307			
6	5	$1\frac{3}{8}$	10			309	310	309			
				$7\frac{1}{2}$		308	309	308		308	306
					5	308	308	308			
7	6	$1\frac{5}{8}$	15			310	311	310			
				10		309	310	309		309	307
					$7\frac{1}{2}$	309	309	309			
8	6	$1\frac{3}{4}$	20			312	313	312		311	
				15		311	312	311	410	310	308
					10	310	311	310		310	
9	7	$1\frac{7}{8}$	25			313	314	314	411	312	
			30			314	315	314	412	312	309
				20		312	313	313	411	311	
					15	312	312	312	411	311	
			40			315	316	315	413	313	310
				25		313	314	314			
10	7	$2\frac{1}{8}$		30		314	315	314	412	312	310
					20	312	313	313			
					25	313	314	314			
11	10	$2\frac{3}{8}$		40		315	316	316	413	314	311
					30	315	316	315		313	
12	11	$2\frac{5}{8}$		50		317	318	317	415	315	312
				60		317	318	318	415		
					40	316	317	317	414	315	313
13	12	$2\frac{7}{8}$		75		318	319	319	416	317	314
					50	317	318	318		316	
					60	318	319	319	416	317	314
15	14	$3\frac{3}{8}$		100		319	320	320	418	318	316
					75						

* Shaft stresses should be considered when alternatives in Heavy Series or Wide Type are used.

FOR standard horizontal general purpose electric motors, all the American ball bearing manufacturers in cooperation with the National Electric Manufacturers Association have worked out the ball bearing recommendations shown in this table. Only the medium (300) and heavy (400) series ball bearings appear in these recommendations

upon steady load and speed conditions without, however, taking into account the fatigue element and other factors which vary with each individual installation. Bearing selections must therefore be made in conjunction with suitable safety factors applied to the load ratings. The manufacturers of anti-friction bearings should always be consulted in the final selection of bearings, in order to avoid unsatisfactory results in service.

Essential Requirements for Satisfactory Performance of Anti-Friction Bearings.

(1) *Selection of the correct bearing size.*—Ball and roller bearings are available in complete standardized series. For ball bearings both of the radial and angular type the metric system has been universally adopted. The S. A. E. standards cover a large range of sizes for light, medium and heavy type radial bearings. Ball thrust bearings are obtainable in both inch and metric sizes.

Roller bearings are usually manufactured to inch dimensions although a number of sizes are available in metric sizes, interchangeable as to bore and outside diameters with standard ball bearings.

As pointed out before, the selection of anti-friction bearings requires a careful investigation of load, speed and operating conditions.

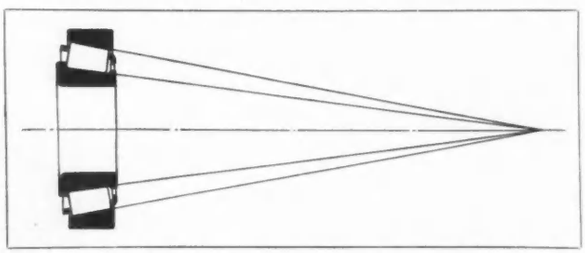
For standard horizontal general purpose electric motors all the American ball bearing manufacturers in cooperation with the National Electric Manufacturers Association have worked out the ball bearing recommendations shown in the accompanying table.

It will be seen that only the medium (300) series and heavy (400) series ball bearings appear in these recommendations.

As a general rule it is advisable to use the light type (200 series) only for small motors (fractional horsepower sizes) and high speed installations. Because of relatively thin races and small balls, light series bearings are not suitable where shocks and vibration are present.

Where heavy loads or overload and shock occur, roller bearings, because of greater load carrying capacity for the same bearing dimensions, are more satisfactory. With limited radial space, roller bearings also are preferable to ball bearings. Ball bearings, on the other hand, can generally be installed in the shortest possible bearing length for a given radial load.

(2) *Correct Housing and Shaft Design.*—The design of



ANGULAR single row roller bearing with tapered rollers. This bearing is suitable for radial and thrust load in one direction. Note that the apexes of the tapered surfaces coincide on a common axis

anti-friction bearing installations should be made with proper regard to the following points:

(a) Ample strength should be provided for in shaft and housing in order to secure a satisfactory bearing support without deflection, cramping and binding.

(b) Accurate and economical machining should be readily possible.

(c) The design should provide for ready mounting and disassembling both for purposes of electrical repairs and for bearing replacements.

(d) The design should have provisions for filling and draining the lubricant.

(e) Effective seals should be provided to prevent leakage of lubricant, especially into the windings and to keep out dirt, grit and water.

(3) *Accurate Machine Work.*—Satisfactory performance of antifriction bearings can be expected only with bearing seats on shaft and housing, finished smoothly to close limits to assure a snug fit.

(*Continued on page* 75)

Buenos Aires Harbor

Exporting to Argentina

By WILBUR T. GRACEY

Twenty-five years American Consul abroad

ARTICLE 5 of a series on exporting electrical products to the twenty republics of Latin America. The next article, which will appear in an early issue, will discuss the problem of exporting electrical products to Chile

WITH an area of over a million and a half square miles, a climate very similar to the United States, and a population of approximately ten and a half million, Argentina has become the leading country of the Southern hemisphere, exporting enormous quantities of dairy products, wheat, corn, quebracho, hides and wool, and importing the products of all the world, principally manufactures ready for consumption, such as textiles and textile manufactures; iron, steel, leather and wood manufactures; furniture, house and office furnishings; railway supplies, tools and implements; automobiles, carriages, wagons and parts; agricultural machinery and tools, including an immense number of tractors; chemicals and drugs; and lastly, but by no means least, electrical equipment of all kinds.

Argentina ranks as one of our best foreign markets for electrical equipment and the imports are increasing annually. Our exports to this market in 1923 were only $3,126,678 but by 1928 had increased to $6,592,686, over 100 per cent in 5 years, and even these figures were exceeded in 1929, as shown in the table on page 80.

According to Argentine statistics we rank third among the countries supplying electrical goods to that market. Germany and the United Kingdom furnish larger amounts, principally owing to the fact that much of the capital invested in the light and power stations came from Europe, and most of the railways and industries using electrical equipment are owned by Europeans.

The products which we supply are principally lamps, meters, small motors, wire, wiring devices, insulating conduit, underground cables, porcelain insulators, telephone apparatus and small electrical devices for which there is a constant demand.

The trade is centered in the city of Buenos Aires, the capital, which has a population of over two million, and is an up-to-date city, with wide, well-lighted streets, and magnificent buildings.

The sky-scraper is unknown, but the numerous six to eight story structures—real marble palaces—appear even too magnificent and too extensive for the needs and wealth of the country.

Buenos Aires was not built for today only, its people have looked forward toward a more glorious future, and their optimism is being rapidly realized.

Some of the wide streets used for business purposes, such as the Avenida de Mayo, stand unparalleled in South America and will compare favorably with any of the boulevards of the old world or the United States.

The Avenida is a mile in length and 120 ft. wide with a double row of arc lights in the middle suspended on artistic iron poles, while on either side rows of trees extend the entire length, separating the roadway from the sidewalks which are twenty feet in width.

With its electrically lighted palatial buildings, electric signs, long rows of street lights, and constant movement of automobiles, seen at night, it is an unforgetable sight.

Argentina is gradually becoming industrially minded, and products of many kinds are now being locally manufactured, including some electrical goods, but there is a general prejudice against domestic products, so much so that some

of the goods made in the country bear indications of foreign manufacture, because the desire for imported goods is so strong that domestic manufactures are handicapped. This is especially the case with locally made electrical goods which are generally considered inferior to the American or British products, and even to German goods which sell on a competitive price basis and are not considered equal in quality to our manufactures.

It is estimated that about half the population of the Argentine lives in the cities—approximately 25 per cent in Buenos Aires and its suburbs.

Spanish is the language of the country and should be used in all correspondence, for catalogs, circulars, and instructions for use of machines. In having translations made for use in this territory it is wise to have them criticized by a native Argentino, as certain words and phrases are current in that country which are not usually used in the Spanish of Spain. Metric measurements and weights are used exclusively.

Practically all of the electrical plants in the country are steam driven, with coal imported from Europe or the United States. Various hydro-electric developments are under consideration and projected, but up to the present the use of hydro-electric energy is not of great importance.

In the outside districts, plants driven by Diesel engines are gaining in popularity, as locally produced petroleum in a crude state has been found suitable for running them.

It is difficult to secure accurate data regarding power plants in the country, but according to latest available statistics there are about 450 plants in operation, about 200 of which are in the city of Buenos Aires and the province of the same name.

The only available data regarding consumption are that of the city of Buenos Aires which sold 1,523,836 kw. hr. per day in 1927 to 286,158 consumers.

Many of the 450 stations mentioned are small, 150 kw. capacity or less, and they supply current only for lighting purposes.

Switchboards, as a general rule, are purchased from the same companies that have furnished the generating equipment, which is also the case with replacements, and as the majority of the plants are of European make, this trade usually goes to those countries. The American-made board is considered satisfactory, and as some of the larger companies have no set rule in this regard there is a certain amount of business in this line.

Our exportation of generators, steam turbine generator sets, and accessories and parts for generators is not an important item of our exports, but we have a growing trade in self-contained lighting outfits which has increased by over 200 per cent in the past six years.

There is little opportunity for the sale of storage batteries, as the plants using them are equipped with European machinery and the batteries—of large capacity—are mostly of British or German make.

There is a call, however, for storage batteries for automobiles, and this trade is largely supplied by the United States.

The demand for dry batteries for doorbells, annunciators, auto ignition and radio work is constant, American-made No. 6 type being most in demand. The Government is a large purchaser of these for telegraphic circuits, buying on contract.

Flashlights are becoming popular, sold in most of the electrical stores and largely used in the country districts where there is a need for a movable light.

The bulk of the batteries used for radio and automotive work we supply, in spite of the fact that German goods are lower in price. The difference in quality is in our favor. Approximately 75 per cent of the dry cells come from the United States.

There is little call for transmission lines, and direct cur-

"Must Sell Our Surplus Abroad"

Said Owen D. Young

in an address given before the Public Policy Session of the Fifty-third Convention of the N. E. L. A., San Francisco, Cal., June 16-20, 1930

AMERICA is confronted with the problem of disposing of three surpluses: agricultural, raw material, and industrial. Speaking of our raw material and industrial surpluses, Mr. Young said:

"We cannot overlook the fact that in 1927 we produced 51 per cent of the world's copper, 72 per cent of its oil, and 43 per cent of its pig iron. The output per man in our factories has been rapidly increasing since 1919. Using that year as 100, the increases for all industries combined in the United States show 1926 at 138, 1927 at 140, 1928 at 147, 1929 at 152 and the end is not by any means reached. In many industries, and especially those in which surpluses exist for export, the increase has been much more rapid in percentage. In the electrical manufacturing industry it is in excess of 164, and in the automotive industry it is approximately 200. It is, therefore, clear that as our production per man increases in our factories, and goes beyond the power of our consumption, we must export that surplus or have corresponding unemployment in those industries. As I have said before, that surplus is more easily controlled. We may reduce it to nothing, and if it cannot be marketed outside of the United States, it will be so reduced. The method, however, of reducing the surplus of our mines and factories, is to let some part of them lie idle, and, worst of all, to let the men who have been employed in that production remain idle. In a word, we have merely translated this surplus into other terms, a surplus of mining and manufacturing facilities which are idle on our hands, and a surplus of labor which is likewise idle.

"The idleness of men who wish to work is the most dangerous surplus which can exist in any country. Its paralyzing blight reaches not into our economics alone, but goes much further. We must learn how to deal with this kind of surplus. It is the same problem as our agricultural surplus, but it should be easier to deal with. It is ridiculous to speak of unemployment as a necessary condition of human society. It is nothing more than a maladjustment of its machinery. It is a blot on our intelligence. It is a drain on our sympathy. It is a promoter of charity which affects disadvantageously both those who give and those who receive. Some day we shall learn to do better, but we must learn it soon. It is easier to deal with, as I have said, than an agricultural surplus, because that is represented by specific articles, whereas unemployed labor may be turned to new channels and new kinds of production. It has not yet been crystallized into goods. Technological unemployment must be taken up by the creation of new industries. Seasonal unemployment may be remedied by setting up complementary seasonal jobs or by larger inventories in the period of smaller sales. Cyclical unemployment may be alleviated by the methods in which the President has so courageously shown the way and in which this industry is so effectively cooperating. But

some part of this surplus of labor should be used for the purpose of creating an exportable surplus of goods and services. It we can make automobiles advantageously for other people, if we can make radio sets, if we can make typewriters, if we can make electrical equipment, then we have direct avenues through which we can market a certain amount of our labor surplus and our plant capacity outside of the United States. This will be of advantage to us and to those who buy our goods. Just as we must market our wheat and cotton and meat where people are hungry and are underclothed, so we must learn to market this surplus of our mines and factories, this surplus of labor and plant capacity, where men elsewhere need the goods which we can profitably make for them.

"How can we market these surpluses, both agricultural and industrial? The method is well known. Those who need our goods are the potential buyers. One cultivates his potential buyers. He does not rebuff them. He seeks their friendship and their good will. If they need credit he extends it. If they have goods which he can take in exchange, without curtailing the business of his own country, he makes it a point to take them. Is that the attitude of America today toward her potential customers? Are we creating good will or bad will in the countries where they live? Are we interesting ourselves in their welfare? Are we concerned about their living standards? Are we extending them credits through our financial machinery? Are we cooperating with them politically in order that they may improve their condition? Are we making friends, and so creating an attitude of mind, a spirit of relationship, which will convert potential customers into actual ones? I venture the prediction that we must do so if we are to conserve our own economic structure, not as a matter of charity to others, but of self-interest for ourselves.

"The people of America, and particularly the farmers with their agricultural surplus and the wage earners with unemployment, must learn that the solution of their problem lies, not in a narrow isolation of America from the rest of the world, not in an insulation of our economic structure, but in the broadening of our interests, the extension of our aid, the development of our credit machinery, the improvement of the economic conditions of other folks in order that they may buy what we so badly need to sell.

"The enemies of the rapid realization of that desired end in America are suspicion, a narrowness of sympathy and point of view, both political and economic; a tendency to treat other peoples as our economic enemies rather than our friends, a threatening nationalism which in its extremes is dangerous to peace and good will. All of these things are too often played upon for selfish ends by racketeers both in economics and in politics. This country and the world has no use for them. Racketeers in finance are not one whit better—in some cases they are worse—than the gunmen who likewise take their toll from society. At least it may be said of the latter that they show physical courage. And the political racketeer is certainly no better than the rest. He gambles recklessly for his own advantage with destructive policies both at home and abroad, which ultimately ends in the very economic depression which we seek to avoid. There is no success for the American people through destructive policies based on suspicion of another's motives or on envy of his success. I have great hope, Mr. President, that the good sense and fine spirit of America will overcome promptly these poisonous infections, and that we will destroy those would-be leaders, both in public and private life, whose chief stock in trade is the public or private assassination of American good will, on which our prosperity must be based.

"How can we market either our agricultural or industrial surplus to the world so long as we act on the principle that we are not interested in the welfare of anyone but ourselves? I had hoped that that old doctrine of narrow and self-destroying selfishness was being supplanted in this new day by a consciousness that men helped themselves the most by helping others too. Isolation in our politics, exclusion in our tariff, mean that we will retain as a just penalty to our own littleness the surpluses which we might otherwise market to the peoples of the world, and which, so long as they stay with us, destroy our own prosperity."

rent is the standard in most all of the country towns.

Wire and cable—about half of the value of imports of electrical equipment—are bought on a price market, and generally Europe has been able to underbid us in recent years. There is a possible trade in armored cables that can be laid underground without conduits or ditches, for use in the central area of Buenos Aires. The cable now in use has impregnated paper insulation as in Europe, and not rubber as we use.

Europe holds the bulk of the trade in insulators and American manufacturers who care to compete must manufacture the European types.

As fixed rates for current are unusual, meters are used constantly, the types handled being of 220 volts alternating current type, with 2 to 10 amp. capacity.

In spite of the high cost of operation, and the use of imported coal, Argentina's rates to the consumer are not high and compare favorably with those of the large cities in this country.

At present electricity is mostly supplied for lighting purposes, but there is a great demand for cheap power, and many of the smaller industries are gradually changing over to electricity. This tendency is also increasing the interest in possible hydro-electrical development.

The demand for power is not large as yet, but compared with pre-war days it is notable, and some of the larger industries have been, and are being electrified, especially sugar refineries, meat packing plants, grain storage houses, and wine manufacture.

Most of the dentists use American electrical operated equipment, and there is a constantly increasing call for motors under 1 h.p.; stationary motors of from 1 to 200 h.p., electrical tools and therapeutic apparatus.

There is, as yet, little demand for domestic equipment, such as laundry machinery, toasters, dish washers, etc. Servants are cheap and satisfactory and have not been educated to the need for these products. Fans, however, are found in offices, restaurants, theaters and other places where large numbers of people congregate, but are little used in private homes. 12 and 16 in. desk, and 56 in. ceiling fans are the desired types. American-made fans dominate this market.

The demand for washing machines is unimportant, but there is a growing trade in electric irons, which we supply. Vacuum cleaners are slowly coming into use, and there is a possible sale for floor polishers, as floors are usually waxed or varnished. The use of heavy draperies and upholstered furniture creates a call for attachments for vacuum cleaners.

Electric refrigeration is used in the shops and is gradually entering the homes. The principal competitor of our goods in this line is a Swedish product which uses gas.

Electric ranges are considered too expensive, and percolators, chafing dishes and disk stoves are not used for the same reasons. Heat radiators, however, are becoming increasingly popular.

Electrical operated elevators are common in the large business buildings, American equipment being preferred.

Manufacturers who are interested in other features of the Argentine trade should consult the Department of Commerce's Bulletin T.I. 536, which gives exhaustive data regarding lighting equipment in use; store lighting; street lighting; window lighting; electric signs; theater lighting; vehicle lighting; searchlights and projectors; lamps, etc. Also see T.I. Bulletin No. 469 on Central Light and Power plants in the Western Hemisphere.

Due to the fact that many of the plants in the Argentine are of German construction, German wiring practice largely prevails, also the fact that many of the plants use alternating current of 50 cycles mitigates against the use of American-made products. The city of Cordoba supplies

(*Continued on page* 80)

In deciding upon the right finish for electrical products, it pays to keep an eye on the engineer who buys electrical machinery to produce the goods he is to market to his firm's clientele

He's a "Stickler" for Good

T. J. MALONEY
New Jersey Zinc Co.

His plant is his kitchen and compared to the housewife who directly buys refrigerators, percolators, irons, toasters, and all the other appliances used in the kitchen, he's a rank crank about what goes into it

IF selling the engineer amounts to producing an article which combines utility with well balanced design, the finish of that article becomes important. As better finishes, more colorful finishes, and more taste in the application of these finishes are achieved, they become vital sales factors. This brings us, with a bang, to the coatings which revolutionized finishes—lacquers and quick drying enamels.

Lacquer is obtainable in two forms: As a clear or a pigmented product which hardens so quickly it can be applied only with a spray gun. This is the type largely used in finishing electrical equipment. As a brushing lacquer—clear or pigmented—evaporation of the solvents is slower—and therefore permits application with a brush. Their use has been greatly reduced by the introduction of four-hour enamels.

Quick drying enamels differ from lacquers through their varnish composition. The great drying speed of new synthetic resins has enabled paint manufacturers to produce enamels which dry very quickly on application. They can be applied with a spray gun, and experienced operators can brush them on satisfactorily.

The use of dense and highly opaque pigments is found advantageous. In other words, if pigments less opaque were used, either the film would be too transparent, or the quantity required to hide satisfactorily would make the finishes too thick for application either by spraying or brushing. Among the white pigments, zinc sulphide, high-zinc sulphide lithopone, lithopone, zinc oxide and titanium pigments are generally preferred.

The spray gun and dip tank have almost entirely replaced the brush in electrical finishing. In applying the popular lacquer finishes a pressure of from 35 to 50 lb. is commonly used. The spray must be held neither too near nor too far from the work. If too far, the volatile solvent which carries the lacquer will be so nearly evaporated by the time the droplet reaches the object that the lacquer will not flow, but will build up a rough or "orange peel" finish. If too close, there will be too much lacquer applied at one point, with equally disastrous results. Lacquer, due to the rapid evaporation of the volatile solvent, spreads or flows very little on the surface being finished. The coating must be uniformly distributed or it will build up in thick and thin spots. Spraying is a knack that all workmen cannot acquire, and though the ordinary run of it does not require high skill, it takes a fairly skilled workman to direct the gun.

At The Atwater Kent Company, automatic spray machines are in use for coating condenser cans. The nozzle is fixed and the cans, in groups of eight, are placed on pinions on a moveable disc. The pinions are also moveable. As the can moves by the spray, it also revolves, and is completely coated. It is then sent through a baking oven. Western Electric also utilizes automatic spray equipment.

Finishes

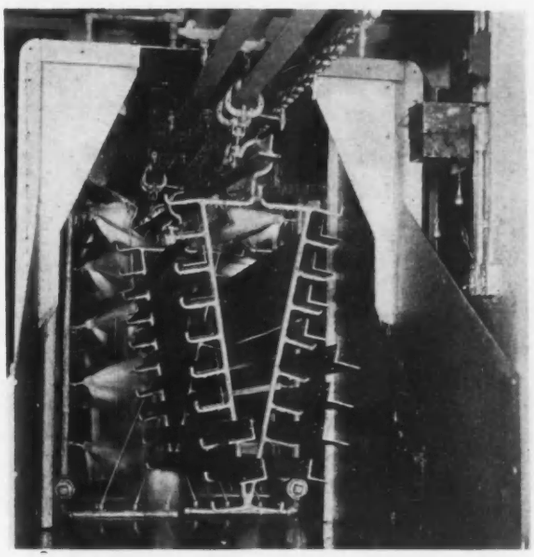
Dipping has definite advantages. One superintendent in a large radio plant declares he is trying to change his finishing operations from 95 per cent spray to 95 per cent dip. His main problem in changing is to design ingenious holding devices which will assure an even flow of enamel, and eliminate dots, reflows, and fatty edges. The angle at which the parts are hung must be the one which offers every surety of a free run off. In addition he places no great reliance on the ability of the dipping oven laborer to place the piece at this angle. The hook or jig must be constructed so the piece can rest no other way.

On console panels, the peak under the old spray system was 5500 a day, using five men and five spray booths. After careful preliminary work designing the right set up for dipping, 5500 an hour were produced. Not only that, but the number of operators cut to one!

Of course, even with the greatest ingenuity used in the design of holding devices, many parts cannot be dipped. There must be a fundamental simplicity—the part itself must help in its own solution. But there are many parts which won't help themselves quite as much as others that have a solution.

Container lids were sprayed at the rate of 600 a day, per operator. The number of rejects was tremendous. They were changed to a dipping and baking process—a single dip and then the customary 45 min. at 260 deg. Fahr. in the drying ovens. To eliminate an air pocket which prevented a satisfactory coat on the interior, racks were devised to give the lids a preliminary plunge in a vertical position baking into the enamel. This is a hand operation. Production is increased to 1500 per hour, and no rejects. Even though these lids are part of the interior of the set, and unseen by the owner, the manufacturer thought it would enhance the set to give them a two-tone effect. So after they were dipped in a deep brown enamel, the edges were marked and a light brown lacquer sprayed on the top. Marking consumed time and wasn't always satisfactory, and there wasn't the definite finish line desired. One day, the superintendent happened to walk through the research department of a large paint manufacturer, and saw an offset printing machine which was not being used. License plates are finished by such a process, and he decided to try it on his container lids. The operation is simple, and the results far superior to any previously achieved. The mixture of his finish is slightly different, but basically the same.

LOADING coil cases receiving zinc dust-zinc oxide paint covering in the Hawthorne Works of the Western Electric Company



FLOW-COAT painting. The paint is sprayed over the switchboard framework from every angle

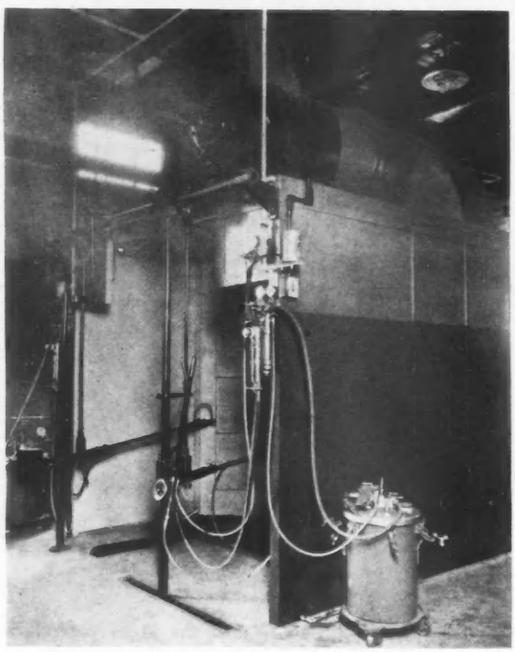
Whether the surface to be coated is cast iron, steel, wrought iron, die casting or any alloy, a primary consideration in all cases is cleanliness. Sand blasting not only cleans the surface but roughens it enough to offer firm anchorage to the filler, or priming coat. Wire wheel and scratch brushing of castings in a mechanical agitator also roughens as it cleans.

Various chemical washing and cleaning solutions are used. A solution of tri-sodium phosphate and sodium hydroxide in which 6 oz. of the former and 2 oz. of the latter are dissolved in a gallon of water—used for cleaning die-castings—is typical. If used as an electro-cleaner this solution should be boiling hot, with the article the cathode and enough current on to cause gassing. This solution will completely remove in one-half to 3 minutes any grease or dirt present. It is not necessary to use the solution as an electro-cleaner. By merely immersing in the solution for 2 or 3 minutes the same effect can be secured. Follow with an acid dip in a cold solution of 10 per cent hydrochloric acid, and a thorough washing in water. The casting after complete drying is ready for lacquer, enamel or japan.

One manufacturer, making high-grade fans, was sending his die castings through a chemical wash and, as an added factor of safety, copper plating before applying the many finish colors he was using. He still had trouble with his lacquer job. Each fan received an individual test, just before the lacquer finish was applied. The slight handling

of the castings on the test blocks often left minute quantities of oil and perspiration. By delaying testing until the color scheme was completely applied, with no handling, or stoppage in the washing, plating and finishing, all his troubles were banished.

On large cast iron surfaces, care must be exercised to keep away from a wavy finish appearance. Ingersoll-Rand on air compressors use a filler to destroy this appearance—



A VIEW of the spray booth used for spraying cable reels at the Hawthorne works

a primer and two careful coatings of lacquer, either a standard battleship gray or the color specified by the purchasers.

Portable air compressors used outdoors must withstand the elements in climates ranging from frigid to torrid. The compressors are given a priming coat and, during ordinary production, stored and weathered in the open for periods ranging from two to four months. There is certainty of a good primer when it withstands this weathering, and the elements weather the primer sufficiently to give a better anchorage for the two remaining finishing coats. Incidentally, the finish color is known as "pig skin," and this finish might be compared to pig skin for toughness before it is satisfactory.

Western Electric has a variety of finishing problems, requiring practically every method and medium. All finishing in black japan, where protection is primary and appearance secondary or negligible—sprayed on the parts. Some work is done with fully automatic spray machines, some by hand, the operators rotating the parts as they are sprayed. A central air filter machine eliminates any dust or dirt which might be inducted in the gun.

The finish is a one or two coat job, according to the after treatment, or the amount of roughage and handling it is to receive. The jobs are oven baked for a period of 1½ hr. at a temperature ranging between 400 deg. and 420 deg. If heated to a greater degree than 420 deg. the finish does not bake hard, but tends to soften. On leaving the drying cabinet, parts immediately go to the inspection and assembly lines.

Lacquering is a more particular operation and special craftsmanship is necessary to produce a fine job. Six standard colors are used—oxford silver, old brass, statuary bronze, ivory, gray and black—the first three are two-tone jobs. Of course any color that is specifically ordered—bronze, gold, aluminum, mauve, will be applied to a particular lot. Two priming coats are given, the primer being a rough base finish. The lacquer is of whatever color, consistency and drying rate specified. None of the final coatings are oven dried.

ALUMINUM enamel is also used. All aluminum spraying is confined to one room to keep the particles of aluminum from being deposited on other finish jobs. In most cases aluminum enamel is a two-coat baked job over a primer.

In preparing metal for japanning, they find sand blasting best and cheapest for their purposes. Sand blasting is done in an enclosed booth somewhat similar to a spray painting booth.

Loading coils, subjected to a severe exposure, are finished for protection; red lead primer and a zinc dust-zinc oxide finish are used. The cases are completely sealed and welded. Here is a fine protective coating—both the primer and finish coats having excellent ferrous metal protective qualities.

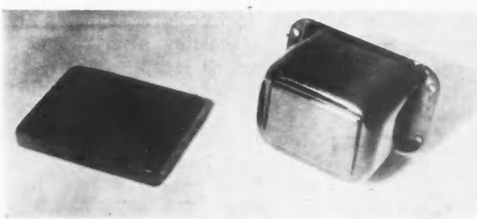
Brushing has not disappeared entirely. Condenser boxes which were dipped always left a spot or bubble on the bottom of the box where the finish dripped off. When set up, this bottom becomes the most prominent part of the box. To eliminate the spot, the condenser boxes are now given a brush finish. Wire enameling is all done on enameling machines. The uncoated wire is unreeled, led into a dip bath, reeled back through a high-heat furnace and back on to a second coil, completed. The entire process is continuous.

Large cable reels are repainted every time they are returned, estimated to be once every three months. A very cheap, quick drying paint (tinted to a standard steel gray color) which will stand up well for a short period, is used. It is sprayed on and must dry within an hour so that it can be stencilled and forwarded at once.

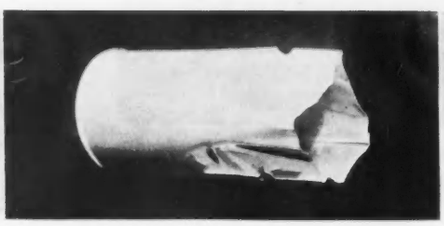
In a large organization, such as Western Electric, finishes are both purchased and prepared by themselves (as is the cable reel paint) and a great amount of experimenting carried on. The products painting division, due to the

(*Concluded on page* 75)

TWO radio parts, originally sprayed, changed to a dipping and offset printing procedure with considerable saving of time and expense



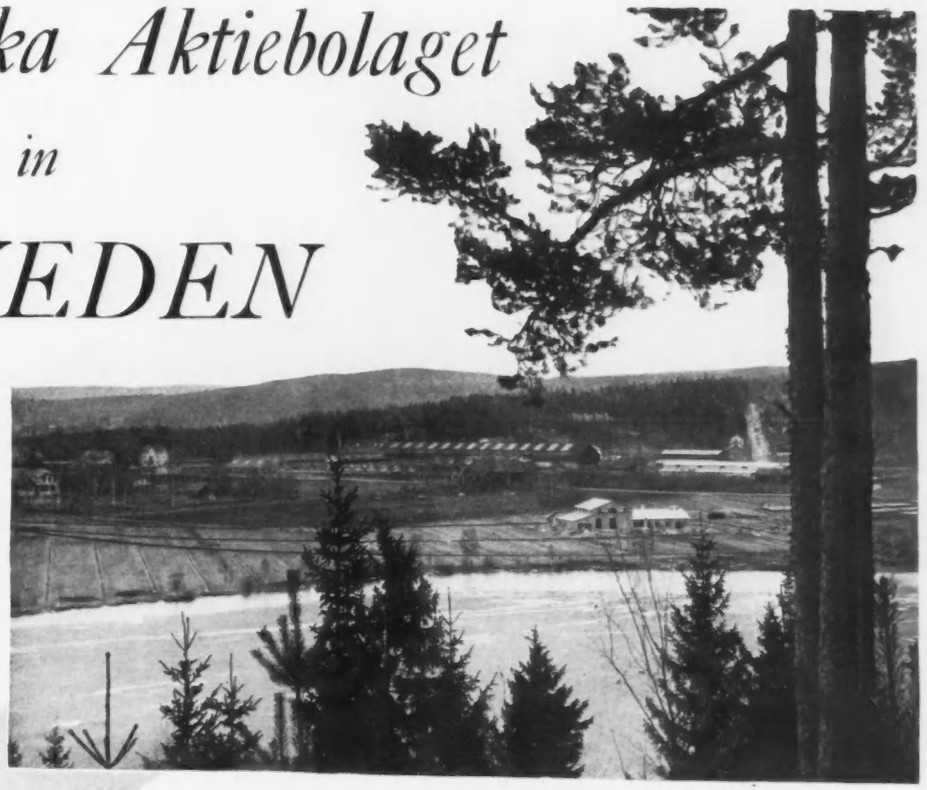
THIS condenser can has been badly distorted, with no bad effects on the finish coating



A SMALL part coated with a finish which assumes a wrinkle effect

Elektriska Aktiebolaget in SWEDEN

(Meaning Electrical Manufacturing in Sweden)

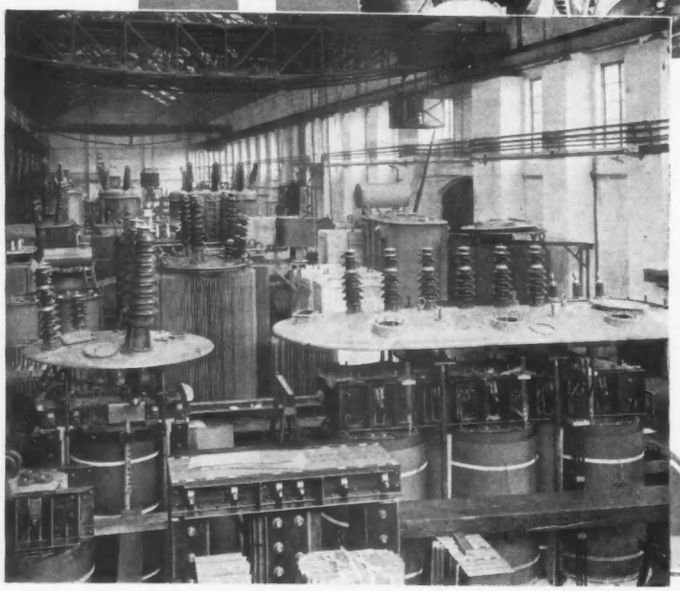


ASEA, a name formed of the first letters of Allmänna Svenska Elektriska Aktiebolaget, is the largest manufactury of electric machinery in Scandinavia. Its plant occupies much of the territory of the city of Vesteras near Stockholm.

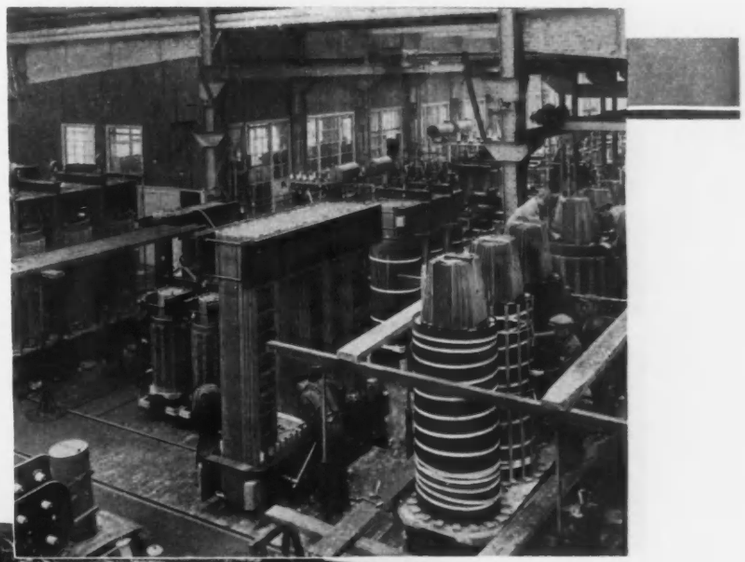
NOT a college but a manufacturing plant. Railroad engines, tram cars, transformers and all types of electrical machines of the day are made in this plant.

GENERAL view of the assembling department for large machines. Note that large members are still being cast in Sweden in contrast to arc-welding used largely in this country.

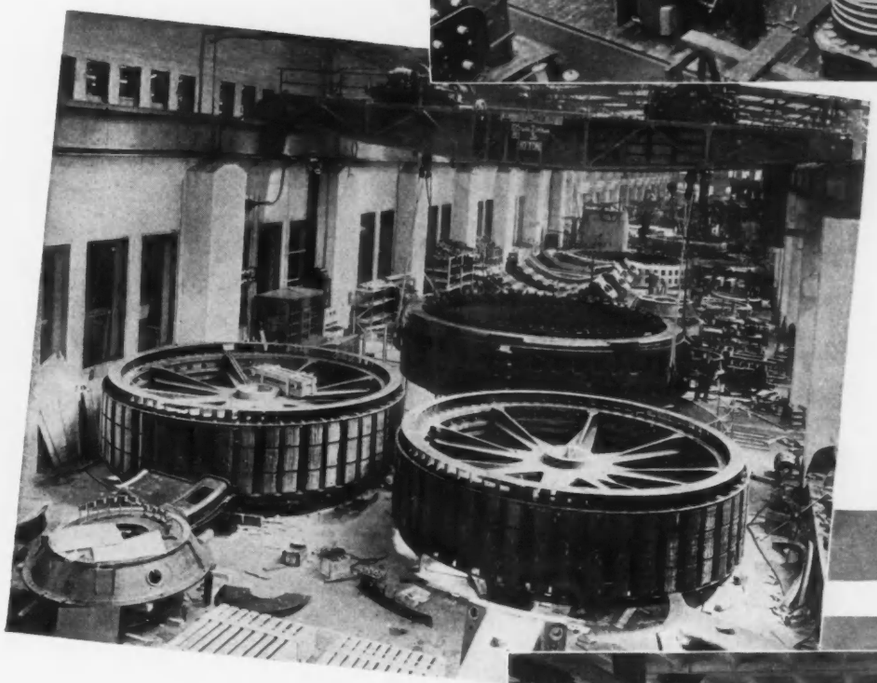
TESTING room for small machines. Note the arched construction of the windows and the monorails running across the ceiling for the use of hoists. The building is fireproof.



LARGE transformers are constructed in Sweden in much the same manner as they are in America. This shows the interior of the transformer works at Ludvika.



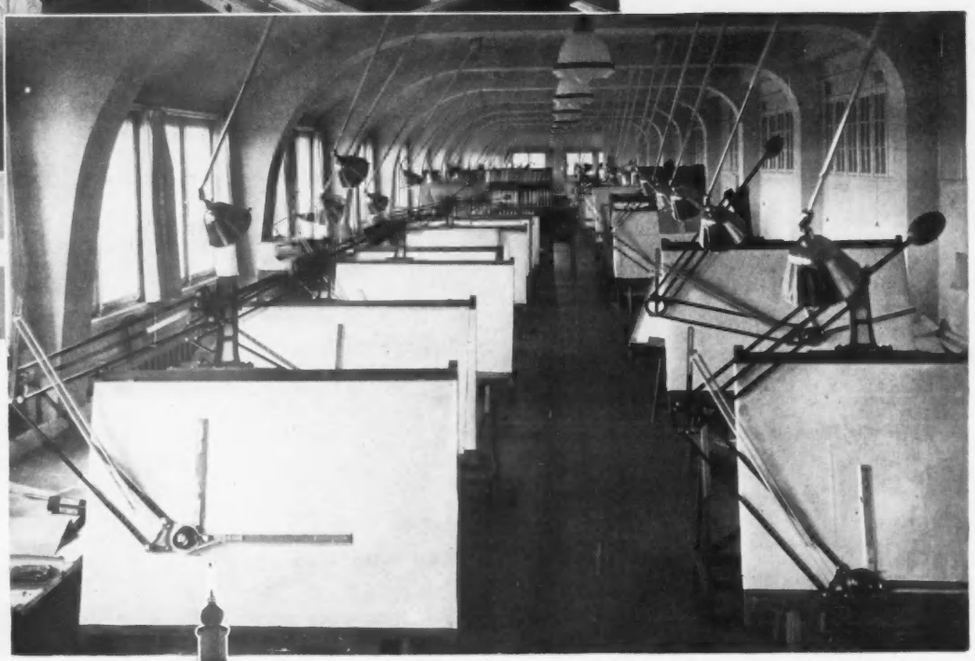
CONSTRUCTION of large transformers. Note the adjustable pipe standards used for scaffolding. Large size three-phase transformers are made in this room.



WITHOUT a "label" to the contrary one might think this is a view of an erection floor in some progressive American electrical manufacturing plant where a large amount of attention had been given to good housekeeping and painting interiors in light colors.

A WORKSHOP for medium-sized machines. All of these stators are built of cast iron. Notice the ceiling which checks the reinforced concrete construction in this country

INTERIOR of ASEA museum. Here is depicted by working model the electrical manufacturing history of Sweden. Here too are portraits of men who have been instrumental in making this history.



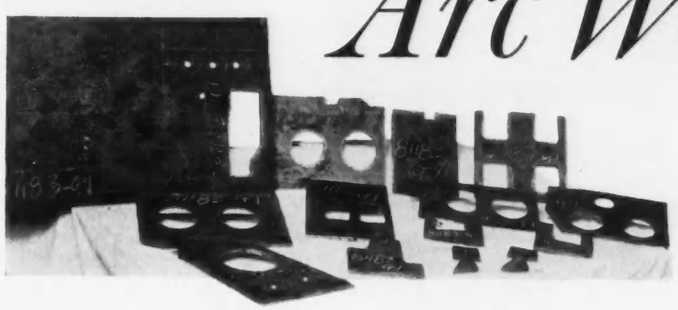
THERE are both general and local illumination in this well arranged drafting room. Note the interesting arch form of ceiling girder construction

AS we leave ASEA, it is three-fifteen by the tower clock. Maybe we can find here and there an idea in this Swedish plant for profitable application in our own factories

DELIVERIES of special machine tools were being constantly delayed. Reason—jigs and fixtures. It took too much time to make patterns and castings. Why not fabricate jigs and fixtures by use of arc welding? It was tried, and it works

PIECES for arc welding are cut out of plate stock with a torch

Arc Welded Jigs and Fixtures



VARIOUS details as cut with the torch, showing also one side marked off and drilled holes for starting the cut

By J. R. WEAVER

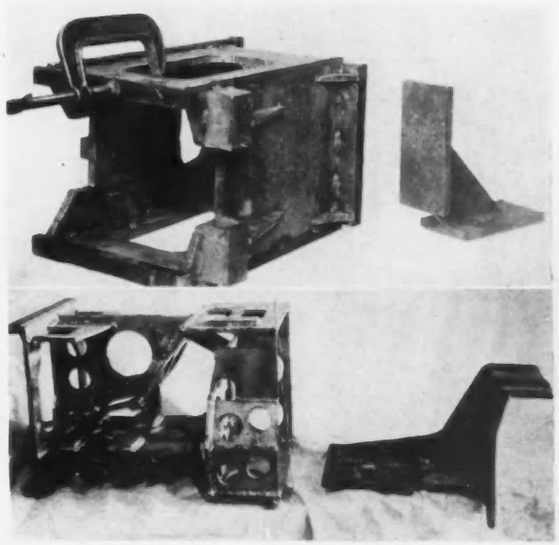
Supt. Manufacturing Equipment Dept., Westinghouse Elec. & Mfg. Co.

IN presenting the above subject, I am not going to try to demonstrate welding in any respect, but I wish to discuss the application of welding to the building of jigs, fixtures and machine tools. This particular application was practically forced upon us about a year ago due to the fact that it was necessary to manufacture this particular line of product on very short delivery. Our business increased very rapidly about that time, so that in order to obtain all advantages possible in manufacturing it was necessary to obtain jigs, fixtures and special machine tools on short notice.

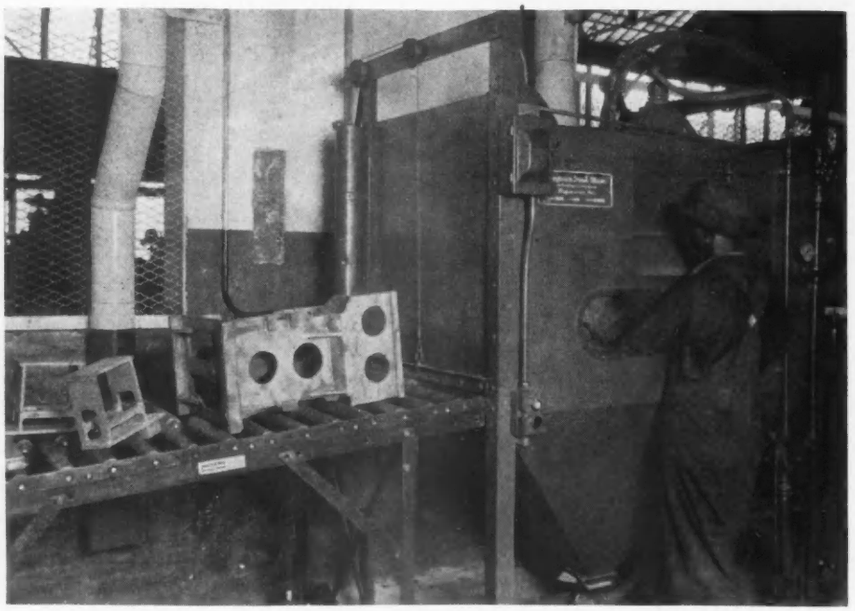
It was quite noticeable on new machine tools purchased from the machine tool manufacturers that invariably in all cases delay was due to time necessary to make the jigs and fixtures. Naturally, the machine tool was more or less of a standard product and could be delivered on comparatively short time. However, in all cases when there was a delay it was due to jigs and fixtures.

When the idea was conceived to manufacture jigs and fixtures from structural shapes welded together, we built several of these jigs and put them through a very thorough test to ascertain whether they would be suitable for our work. We naturally tried these jigs for all the inaccuracies that are liable to occur due to warpage, distortion, etc., and then decided upon a definite program of manufacture which has given us extremely satisfactory results. The thought was advanced that the jigs and fixtures would not maintain their shape after a period of time, but we have used them for about a year with less maintenance than we had with cast iron jigs.

As I mentioned above, we found it necessary to obtain

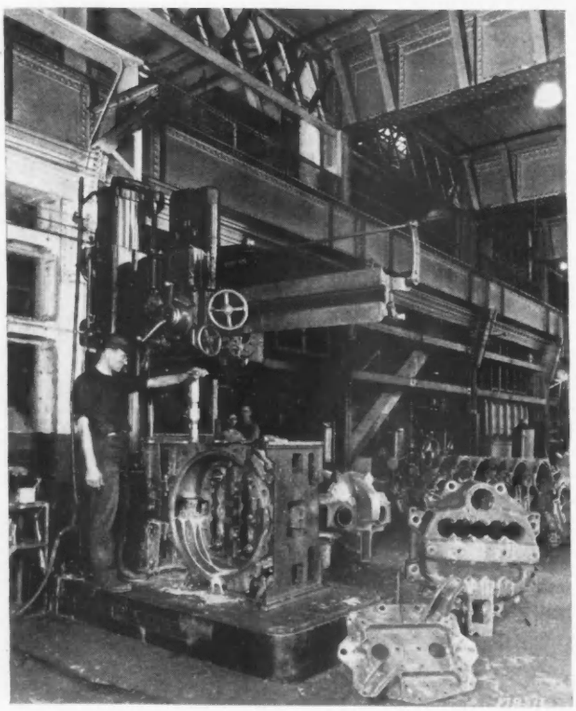


UPPER view—a clamp holding a tool steel foot in place for tack welding. A squaring or setting up angle is shown at the right. Lower view—body of drill jig for bracket for talking movie machine. This jig is 15 by 23 by 12½ in. and weighs only 120 lb. The bracket for which the jig was designed is shown at the right



ABOVE — When the fabricating process is complete, the scale is removed by shot blast. Note the conveyor attached to shot blast machine

AFTER shot blasting the jig is painted with oil-resisting paint. Painting is done with a spray gun to make smooth surfaces, preventing chips sticking to jig



THIS jig for main base of oil circuit breakers has been in use for more than a year, and the author states that less maintenance has been necessary than on cast iron jigs

jigs, fixtures and machine tools on very short notice and, in checking our deliveries of cast jigs versus structural jigs, we found that when putting the orders through for cast jigs in the regular way, it required about four weeks to obtain our castings. Of course, it was necessary to make patterns, core boxes, etc. The castings had to be cast, cleaned, etc., before being sent to the shop. We find that with the welded structure we can obtain the most complicated jig in not more than one week's time. The average time is about four days and you can readily appreciate what a decided advantage this is in manufacture of any kind of product.

These jigs are made from hot rolled steel of whatever shapes and sizes are necessary and welded together. Where hardened pieces are required, these are made from tool steel, hardened and attached to the jigs by means of screws, bolts, etc., or in a case of bushings, pressed in holes provided for them. We experienced some trouble with the feet on these jigs, due to the fact that after the jig was annealed these feet were too soft, so that chips on machine tools would embed themselves in these feet. In order to overcome this, we made the feet from tool steel and heat treated them before welding to the jig. These feet are then drawn to a scleroscope hardness of 45 to 50 and are of sufficient hardness, but they still can be machined. The results have been very satisfactory.

Of course, it was necessary when we adopted welded jigs and fixtures to change our entire method of manufacturing jigs, fixtures and machine tools. This not only included the actual manufacture of these jigs and fixtures in the shop, but also in designing them. In order to have the proper information on the drawings, it was necessary to train our tool designers in the art of welding to such an extent that they could put the proper information on the sketches which were sent to the shop. In order to do this, we incorporated in our standard book several sheets of instruction, which, in addition to supplying the workmen in the shop with information, also standardized the manufacture of welded jigs and fixtures.

One of these sheets shows the various types of welds and the size of bead which is used on welded jigs and fixtures. This is a standard throughout our shop, so that the workman is familiar with it and any reference to it is readily understood.

In order to avoid delays due to material being out of stock, we have listed in our standard book a sheet showing the standard stock size of steels that are

being used for this particular method of manufacture.

This sheet gives the sizes of bar and plate stock. When bar stock is not suitable, the part is cut to size from a plate by means of an acetylene torch.

When the designer makes his drawings of a jig, he lays it out without showing any particular method of construction. Therefore, it is necessary for the tool designer to make a separate sketch which is called a welding and machining sketch. This gives the detail construction and indicates in the bill of material what material is to be ordered and from the drawing can be obtained the information as to the shape desired. This material is then cut from the proper sized material with a saw as in the case of bar stock or with acetylene torch as in the case of a plate. The parts are then assembled and welded together, which I will explain later on, but I wish to call your attention to the title on this sketch which indicates the total length of a certain size weld necessary to completely weld this jig. This is done for the convenience of the time study supervisor, who estimates and sets a value on the time it should take to manufacture this jig.

Of course, the question has come up frequently that it is not possible to test a weld without destroying it, and the workman must be relied upon for good workmanship. We realize this and, in order to control this phase of the welding, we are requiring that all welders stamp their work with a stencil. This stencil identifies the particular welder who performed the work and, in case there is any question, it can be readily traced back to the man who did the welding.

Periodically, we run a test on welds and if we discover any welding that is not satisfactory the workman is required to take additional instruction, or if he proves entirely unsatisfactory, he is taken off the job.

In the above I have discussed the method of preparing sketches by the tool designers and now I will try to tell and show you how the jigs are actually manufactured. At the top of page 57 is shown a cutting machine which is used for cutting various parts from plate stock that are required to make a jig. We have several different types of these machines in this department for cutting any shape or size necessary.

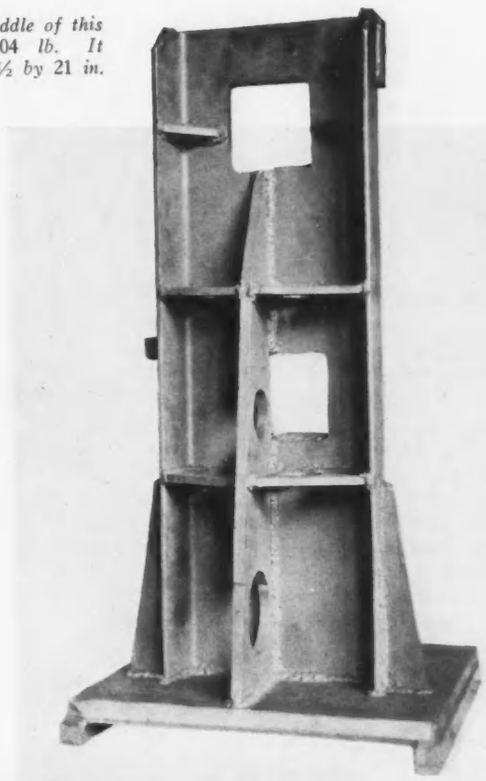
The illustration in the center of page 57 shows a number of parts cut to size to make a jig. You will note that all the necessary large holes are cut by means of an acetylene torch in the plates before they are assembled into a jig.

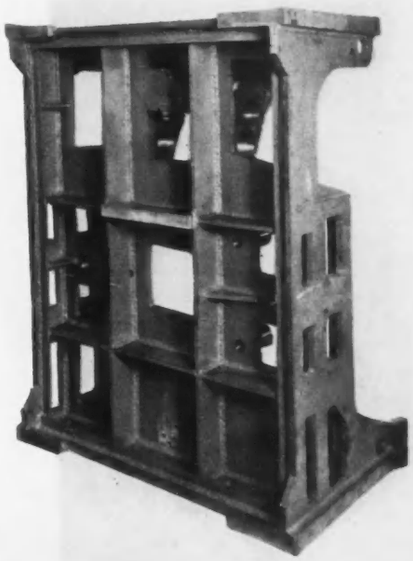
These various detail parts are assembled by a mechanic and tack welded just sufficiently to hold these parts together. This is done by a mechanic so that the parts are properly located, also so that the jig is squared up and is a good job when it is finally finished. After the tack welding, the jig is passed to a welder, who completes the job by welding the jig as it should be.

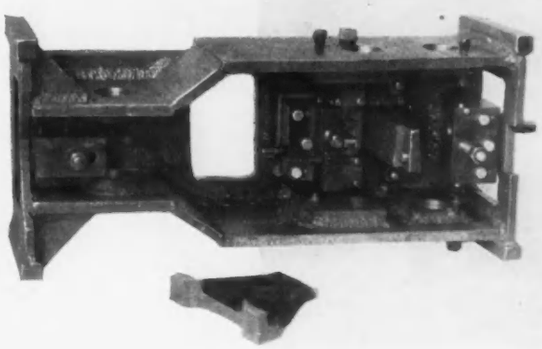
Illustrations at the bottom of page 57 show a jig jacked together ready for the welder, and a jig completely welded. You will note that this jig is fairly large, however, it only weighs 120 lbs. It is used for drilling the bracket which is shown at the right of the jig.

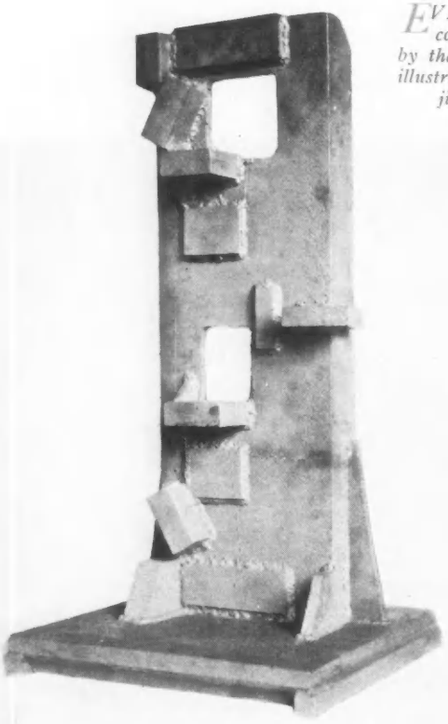
The fact that these jigs are made from hot rolled steel and the welding distracts somewhat from the appearance of the completed jig, also certain strains due to the welding must be removed from the jig so it

THE jig in the middle of this page weighs 1304 lb. It measures 39½ by 51½ by 21 in.

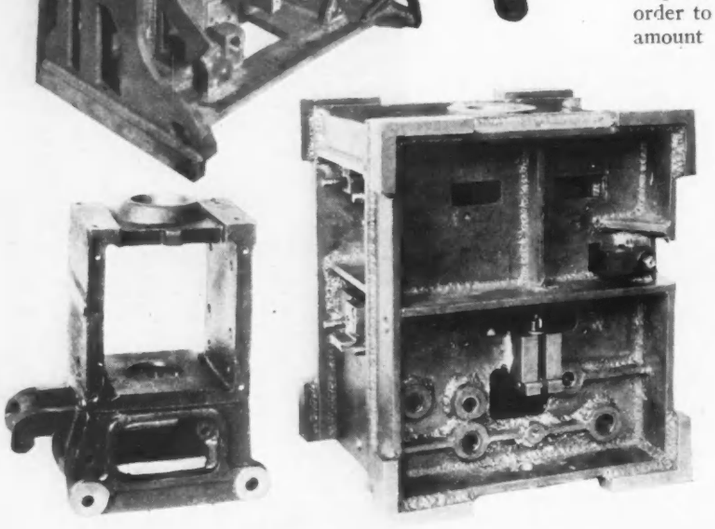








EVERY type of jig construction can be successfully fabricated by the use of arc welding. These illustrations show many types of jigs that are now in use.



maintains its shape and size. In order to overcome these conditions, we normalize all welded jigs in order to remove strains. This is done by heating the jigs in a furnace to a temperature of 1000 deg., after which they are allowed to cool in the air. Due to the use of hot rolled steel and the normalizing, a certain amount of scale is present on these jigs, so it is necessary to remove it. This is done by means of a sand blast machine, as shown in the illustration at the top of page 58. The appearance of the jig is greatly improved by the sand blasting operations. After the sand blasting operation, the jigs are spray painted, as shown in the center illustration, page 58. The jig is sent to the shop for regular machining and the machining is no different than it would be for a cast jig except that there isn't as much material allowed for finish as is ordinarily allowed on castings.

To give you an idea as to what extent we have gone on the welding of jigs and fixtures, see the illustration in the center of this page. This jig weighs 1300 lbs., the overall dimension being 39½ in. x 51½ in. x 21 in. You will note that this is a complicated jig and, in order to make a casting, it would take considerable time both in the pattern shop and in the foundry. This jig is built entirely of steel, using hot rolled bar stock and plates. I wish to call your attention particularly to the bosses shown in the illustration at the top of this page, which are made from hot rolled round steel cut off with a saw and welded in place.

The illustration at the bottom of page 58 shows a welded jig being used on a drill press. We have experienced no difficulty in these jigs due to inaccuracies, although we have been using them for approximately a year.

Illustrations on pages 59 and 60 show several more different types of jigs that we have manufactured which will indicate to you that it is feasible to make any kind of a jig necessary by this method.

In addition to the above, we had the advantage of considerably more strength and less weight with a jig made from steel. This is due to the fact that the jig can be made from thinner material and it is not necessary to increase the sections to reduce casting difficulties, etc. It is also possible to place metal where it is most desired in order to make a stronger jig with the least amount of weight. Also in case there should happen to be a change in the jig required due to the product being changed or, for any other reason, it is very easy to remove any interference by means of an acetylene torch and reweld the parts in new locations if desired.

Not only has arc welding been successfully used in the construction of jigs but also for various special machines such as are designed and built in the Westinghouse plant. For example, a double-head oxy-acetylene cutting machine was fabricated by arc-welding, and in operating this equipment, no trouble has been experienced from misalignment, vibration, or similar defects.

Thinking It Out
With the Editor

Don't Be a "Mere Support for a High Hat"

THERE are thousands of men who are called "executives," who dress like executives and who superficially may look and act as executives are supposed to look and act, but who are actually little more than grown-up office boys. This type has never outgrown the idea that business is busy-ness, and their measure of busy-ness is the number of things they do with their hands and feet and mouth—O. K'ing memo's, dictating letters, signing their names, keeping charts up to date, and walking around their offices, plants and stores. They fail to understand that executive work is brain work, not muscular effort.

This was one of the themes of the lead article in last month's ELECTRICAL MANUFACTURING. That executives like the truth even though it may hurt is evident from favorable comments received from readers.

When mere supports for high hats head up a business there is little hope of doing anything about the wastes in the use of overall or white-collar labor.

Most businesses could be made profitable if every executive, workman and clerk had to justify his presence on the payroll on the ground that he is giving the stockholders value received.

The Engineer Must Be a Broad Gage *Miser*

"THE opportunities for the engineer in business are greater today than ever before. But the engineer of today must be commercially minded. The trend today in manufacturing and selling is based entirely on the needs of the customer. It is, therefore, more important to supply what the customer needs than what the manufacturer has to sell. It is here that the modern engineer takes his place in both production and sales."

It was over two years ago, right in the middle of our period of tremendous activity and high prosperity that these thoughts were expressed by W. S. Hovey, president of Fairbanks, Morse & Company. But during these present days of temporary recession these statements continue to ring true. In fact present conditions make these facts stand out in high light on the current management picture. And that's why it seems worth while to recall them at this time.

Mr. Hovey went on to say that modern business is not only depending more and more on the engineer to analyze the requirements of the customer but is also calling on him to help increase the profits in business. Competition is so keen that the waste and loss of a few years ago is the profit of today. The engineer, through a careful study of production methods and the elimination of waste, has been able to reduce the amount of material entering into products without in any way decreasing the quality or the factor of safety. "The engineer in this respect," Mr. Hovey says, "must be a *broad gage* miser." But don't overlook the emphasis on "broad gage."

Why Not Arbitrate

WHEN you go to law with a customer you may win the lawsuit but you are sure to lose the customer. To take a business dispute to the courts is about the most foolish way to spend time and money.

Nearly all states have laws providing that disputes can be settled informally out of court by submitting to arbitration. Arbitration is not generally practised because most of the arbitration laws do not go far enough. Although both parties may have agreed to arbitrate, in most states either one may withdraw and go to court at any time before the case is decided. The one who sees that things are going against him usually avails himself of that loophole. He has nothing to lose; and he may win at court.

To make arbitration more generally useful New York and New Jersey have adopted arbitration laws that do not have this weakness. Having agreed to arbitrate, neither party can withdraw. The decision of the arbitrators is final and can only be appealed if fraud can be proved. If a clause providing for arbitration is inserted in a contract, disputes arising from the contract must be arbitrated. Since these laws were passed thousands of business men have kept their disputes out of court.

Arbitration has many advantages. For one thing, the hearings are secret. It is no longer necessary to air private business affairs in public.

The decisions of arbitrators are more often in accordance with strict justice than are the decisions of juries. Most lawsuits involve technical business points that the average juryman does not and never can understand. Both sides hire expensive experts who usually give absolutely opposite testimony. The jurymen have trouble learning what the facts are; rather, they often let their sympathies dictate their judgment or they are swayed by the most skillful lawyer.

When, however, two men arbitrate a commercial dispute they usually select as arbitrators men who are familiar with the customs of their industry. These men know the ropes and don't have to be told anything by expert witnesses.

There are no formalities or technicalities as there are in a court. There are no rules of evidence to observe. Any evidence that has a bearing on the case—even hearsay evidence—can be submitted.

Arbitration is quick. A case can be tried without delay. Often the award is handed down after a few hours. Seldom does the hearing go on for more than two or three days. The cost is nominal. Lawyers may be present—but usually they are dispensed with.

Arbitration can be availed of by business men anywhere. But to make it of the greatest good, all states should put teeth in their arbitration laws so that, having agreed to arbitrate, there can be no withdrawing.

L. I. T.

Ready to Apply

Eight liftable ideas for cutting costs or simplifying the day's work of the electrical manufacturer

A Short Life but Brilliant

IF YOU have ever suffered the annoyance of having the commercial photographer explode a flashlight powder in your plant during working hours, if under these circumstances you have had to appease the superintendent or smooth the ruffled feelings of the department foreman who sees the powdery ash settle on the

A Flash but No Smoke

This new flash lamp performs the function of a regular photographic flash without the usual noise, odor or smoke

day's production, you will rejoice in a new photo flash lamp which is now available.

This lamp has a voltage range from 1.5 to 125. Thus it can be used on the usual 115-volt circuit in the standard screw socket, or even with a flashlight or storage battery.

Since the flash is confined within the bulb, there is no fire hazard. And likewise, there is no smoke, no noise and no odor. And, unlike flashlight powder, this photo flash lamp is so nearly instantaneous that there is no staring or blinking of the eyes. The absence of noise means that there is no startling of the people who may be in the picture being taken. G. H. T.

Forecasting Financial Needs

IN ADDITION to a daily cash report which gives the amount of cash received and paid against the principal items (as shown in the right column) the total of the previous report and the total to date, the Leeds & Northrup Company makes up a cash budget at the beginning of the month, which enables it to forecast quite accurately the total amount of money needed to finance the month's business. A specimen of such a cash budget is shown below.

This report is made up by the treasurer, and a copy is furnished to the president and vice-president. The principal difficulty experienced with this report at present is the development of a plan to determine more accurately the amount to be received from accounts receivable.

The disbursements can be estimated with a satisfactory degree of accuracy and, if the company could estimate the receipts as closely, they feel that they would have a very satisfactory forecast. J. J. B.

How One Company Interviews Prospective Salesmen

UNTIL a few years ago, the Eureka Vacuum Cleaner Company interviewed applicants individually and made considerable effort to sell them the job. By substituting a system of group interviewing, they have secured a better type of salesman, and reduced the turnover and costs of recruiting. Under this plan a fairly large group of applicants is taken into a special interviewing room, where they are requested to fill out application blanks.

Without inspecting these applications, one of the sales managers explains to the group the Eureka organization, the field to be served, and the opportunity for its salesmen. The aim of this part of the talk is to create a desire to join the organization.

The next step is to establish the thought that a job with the organization is hard to get and requires hard work to keep. Terms of employment are not mentioned. At the end of the talk the men are turned over to the sales supervisors for individual interviews. The basic idea is that if a man is not interested after the group interview there is little chance of putting him in the right attitude toward selling the product. More than 75 per cent of each group, however, has applied for admission into the training classes, and two-thirds of these have qualified. J. B. J.

Cash report for _____

Receipts	Pre. Report	Today	Total to date
Accts. receivable			
Discounts all'd			
Cash rec'd.			
Returns from Salesmen adv.			
Lunchroom rects.			
Personal accts.			
Notes rec'vable.			
Interest on investments			
miscellaneous.			
Total			
Disbursements			
Accts. payable			
Discount taken			
Cash paid			
Salesmen drafts			
Payroll			
Personal accts.			
Petty cash			
miscellaneous			
Total			
Balance from previous report.			
Today's receipts.			
Total			
Today's disbursements			
Bank balances: German Trust			
Central National.			

Prepared by _____

SEPTEMBER CASH BUDGET

RECEIPTS		DISBURSEMENTS	
Sept. 1—Cash on hand:		Sept. 1, Accounts payable	$000,000
Germantown	$000,000	Less items paid....	000,000
Central	000,000		00,000
	$000,000	Sept. accts. payable..	00,000
Accounts receivable..	000,000	Salesmen's drafts ...	00,000
		Petty cash	00,000
		Payrolls	000,000
		Dividend	000,000
		Balance at end of month	000,000
			000,000
	$000,000		$000,000

Both a Daily Cash Report and a Monthly Budget

The report on the upper form is a daily cash report used by one electrical manufacturer. Below it is the substance of a form which enables a reasonably accurate forecast of the money needed to finance a month's business

A Market for Short Wire Lengths

WIRE and wire products for electrical equipment manufacturers and radio manufacturers are the products of the Acme Wire Company. This company is primarily a specialty manufacturer and makes to customers' specifications.

Hook-up wire for radio work is specified in 30-in. lengths. The company's practice in the past has been to throw away the short lengths of wire resulting from making up the standard lengths. In an effort to eliminate this waste of material, the company made an investigation to determine what, if any, commercial uses could be found for these short wire lengths.

As a result, it was learned that wire in lengths of 3 in. and over could be used as lead wire in radio condensers, and was, in fact, well suited for this purpose. Thus, a profitable use was discovered for what has been up to this time a waste product.

J. J. B.

Making One Service Device Feed Another

TO USE modern handling devices is not in itself proof that you are going the whole way in the matter. To get the most out of such pieces of equipment they should be planned so that their duties dovetail into one another. An example of this is illustrated in the photograph below.

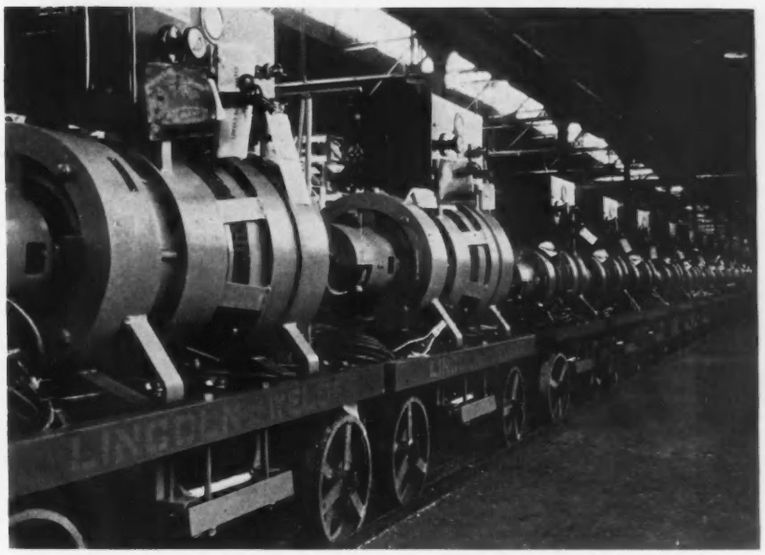
Here are shown both a hand lift truck and a power-driven tiering machine. Each one used separately indicates commendable efficiency, but you only go the full way when you combine their activities, as in the case shown.

It is only necessary to wheel the platform-contained load to the waiting platform of the lift truck, and the load is quickly transferred from a horizontal journey to a vertical one destined for the rafters.

H. C. K.

In and Up

Combine two handling devices, and you often get more than twice the utility



On Their Own Wheels

Progressive assembly generally requires a separate carrying device to move the product from one job to the next. Not so with these portable welding outfits. They travel down the assembly line on their own wheels, which are guided by channel iron tracks fastened to the floor

Interesting Even Though Not Widely Applicable

A RATHER unusual application of electric heat has been made in one Chicago plant. A short time ago the company required an oven in which to bake japan on refinished steel parts.

Among the products of the company was a fireproof vault, insulated with 4 in. of amorphous silicate and asbestos fiber, and designed to hold a temperature of less than 250 deg. Fahr. on the inside for 2 hr. while subject to a temperature of 1800 to 2000 deg. Fahr. on the outside. The company reasoned that this vault should be as able to retain heat as to repel it, so two 2½ kw. oven heaters were installed at the bottom of one of their large-sized vaults. Three holes were drilled on each side at the bottom and a vent pipe connected at the top for ventilation. A controlling thermometer and a contractor panel were installed and the oven was complete.

Because the transformed vault was originally intended for use in an office, it presents a much better appearance than usual oven installations. The inside and outside are finished glossy dark green, japan trimmed with light green, and metallic parts are nickel-plated.

The oven is 44 in. wide, 75 in. high and 35 in. deep. It operates about 8 hr. each day for 20 days a month at a current cost of about $15 with electricity at 3 cents per kw.-hr.

J. J. B.

When It Pays to Use Leak-Proof Bearings

IN THE woodworking departments of electrical manufacturing plants, a certain amount of accumulation of dust and shavings is unavoidable. And this material gathering upon bearings of rotating machinery rapidly siphons, due to the decided capillary attraction of the dust for oil. Thus the lubricant is drawn out of the bearings unless its escape is prevented by thorough sealing.

One concern which changed from plain to sealed bearings compared the amount of oil used and the attention necessary under the two different set-ups. The difference was great.

The older type required bi-weekly inspection which usually resulted in discovering the need for more oil, while inspections every three months are quite sufficient for the sealed bearings.

And in this concern's experience, there have been very few bearing replacements, and it is significant that none of these was due to the loss of oil.

G. E. C.

Perhaps you too have worked out little cost-cutting plans which are of value. If so, turn them in for use in this idea-exchange—a feature appearing each month in ELECTRICAL MANUFACTURING *under this heading "Ready to Apply." Ideas accepted will be paid for at a liberal contribution rate.*

Electrical Materials Widely Used—

MICA

By WILLIAM CRAWFORD HIRSCH

MADAGASCAR, France's island possession in the Indian Ocean, is our chief source of amber mica. Canada is our next important source of this material. North Carolina and New Hampshire are our chief mica-producing States

IN the current catalog of one of the country's leading electrical manufacturers the subject of Mica Insulation is thus introduced: "The part of an electrical machine most liable to failure is the insulation. In an effort to reduce this weakness of electrical machinery, our engineers have devoted much research to obtain better insulation—insulation that would be as good as our motors and generators upon which it was to be used. In particular, their work has effected many improvements in the manufacture of mica insulation, but *neither our engineers nor any others have ever found a satisfactory substitute for mica.*" Mica's praises have been sung by electrical consumers for more than half a century. It has been called by electrical authors "the perfect insulator" and by others "the most important insulating material used in electrical work." Today, more than ever, it is recognized that the highest grade of natural mica is an essential requisite in endowing electrical machinery, especially that of the "super-power" type, with the years of useful life and uninterrupted service exacted by purchasers either by way of a factual guaranty or a more informal pledge on the vendor's part.

Geologically, the mica group of minerals, essential constituents of igneous and crystalline rocks of many kinds, is one of extremely wide occurrence, but sources of supply for mica of the size and quality required in the highest type of electrical insulation are relatively few. India has held the position of the world's most important mica-producing country since the electrical industry's swaddling-clothes days. It continues to be the world's chief source of supply for muscovite (white) or potash mica, the so-called clear ruby, free of stains and spots, being held in the highest esteem by electrical consumers. Besides muscovite, which designation is derived from the popularity enjoyed by mica in the Russian capital as the ideal window pane material in pre-Soviet days, phlogopite (amber) or magnesia mica is the only other variety of electrical importance. For a time Canada ranked as the world's most important source of amber-mica, but in recent years Madagascar, France's island possession in the Indian ocean, a veritable treasure-trove of raw materials, has been forging ahead toward market leadership in that variety.

North Carolina and New Hampshire are the chief mica-producing States among half a dozen that contribute toward the domestic output all of which is of the muscovite variety. Under the influence of high War prices, North Carolina's output of sheet mica in 1919 exceeded 1,000,000 pounds. Taking the last decade as a whole, domestic production of sheet mica has shown a declining tendency, although there was quite a spurt in the output in 1926. It remains to be seen whether the higher tariff rates provided in the Hawley-Smoot Tariff Act will result in quickening the production and consumption of domestic mica for electrical purposes. Importers contend that so far nothing has happened to alter the ratio of imports from India which supplies about three-fifths of our domestic requirements. When it comes to high-grade mica of adequate size for particular insulating purposes, spokesmen for the foreign producers contend that

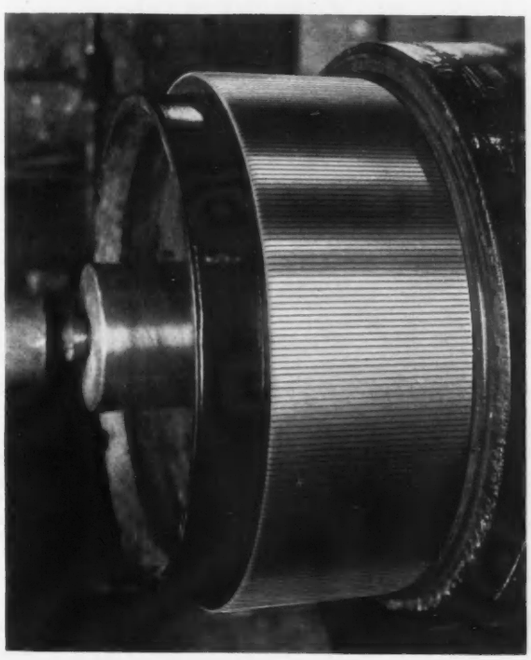
such material is simply not to be found in the United States and that the high duty on mica is, in fact, nothing more than a tax on the electrical consumer. On the other hand, Oliver Bowles, U. S. Bureau of Mines, voices the conviction that "the United States could produce a much larger proportion of its requirements of high-grade mica than is being supplied at present" and that "increasing activity in mica mining is to be expected." U. S. Bureau of Mines records of the proportion of larger-size mica output, based on approximately two-thirds of the entire production of sheet mica, indicate yields of less than 2 per cent of sheet mica 3 by 4 inches and over in size, the output of punch, circle and other small sizes constituting more than 85 per cent of the entire domestic sheet production. Size alone, of course, is no adequate criterion of electrical usefulness, freedom from stains and streaks, caused as a rule by the presence of minerals tending to impair dielectric strength, being of paramount importance. There are factors other than the disparity between the standard of living in India and in other mica-producing countries and our own that tend to put the United States at a disadvantage. A good deal of the domestic production is intermittent and frequently seasonal in character, being in the hands of agriculturists with whom it is a side issue. So far at least, many marketers of mica and manufacturers of mica insulation have found it more profitable to buy the crude mineral from farmer-miners than to do their own prospecting and mining. This makes for a continuance of primitive methods of mining, in some parts of the South of the "gophering" or "groundhogging" type, the mica in sight being taken out without the least effort at systematic development on the waste rock being left to accumulate, eventually barring further operations. Anything like control, so that deposits may be made to yield the highest grade and largest size mica of which they are capable is out of the question under such a set-up. In New England, the mica-winning process partakes more of the characteristics of quarrying than mining, production in that territory being largely associated with that of feldspar. The natives of India who work in the mica mines of that country hold mica in reverential esteem. To them the mica "books" are a sort of sacred plant, a superstition fostered by the discovery of surface crystals in soil worn away by heavy rain. Mica has served the native of India as a medicament in even deadly diseases for generations. The Hindus of Bengal, Rajputana and Madras, therefore, bring to the tasks of mica mining, sorting and cutting, in addition to inborn aptitude, an instinctive knack of conserving in mining as well as in the subsequent operations every millimeter of useful material. On these advantages of the labor market Anglo-Indian capital has superimposed the skill of the scientifically trained mining engineer and highly developed production methods in all departments. Back of all this stands the London mica market with its fingers on the pulse of the world's consuming centers. In the opinion of Government technologists, if the additional protection given to domestic mica producers by the 1930 Tariff Act is to result in the upbuilding of a really strong domestic mica industry and not merely in an extra tax on the electrical consumer, the very first step must be the introduction of efficient mining equipment and methods. Haphazard, pastoral extraction of the mineral must give way to highly mechanized and efficient operation which will permit of the closest control with a view to size, dielectric strength, and conservation of resources.

THE manufacture of built-up mica and of mica products, such as commutator rings and segments, tubing, winding and cover plates for heating devices, discs, mica cloth, mica paper, flexible sheets and mica tape constitutes an industry of high attainments in which American manufacturing ingenuity has been and continues to be applied with the result that precision, uniformity and general quality of products show constant progress

Making Big Sheets of Little Ones

IT is conceded that, had the electrical industry continued to use large pieces of mica in the lavish manner it did in the earlier days of its development, the supply of really high grade sheets of suitable size would have been exhausted long ago. When the pioneers of the electrical industry looked around for a suitable natural non-conductor, they found it serving in the doors of stoves and lamp chimneys. India would and did furnish mica in sheets of reasonable size in any quantity desired. Pieces up to 6 inches in width and 15 inches in length were common. It mattered little that for electrical serviceability impurities and foreign substances had to be removed with the knife, resulting in the accumulation of mountains of waste and of small pieces for which there was little commercially profitable outlet. Presently the mica producers found that utilization of the mineral for ornamental purposes, painting, yes even for stove and oven doors was a picayunish affair by the side of the electrical industry's demand. Its purchases had more than trebled the number of laborers employed in India mica mines. But what of the smaller pieces, the trimmings and cuttings for which there was a very limited outlet, if any at all? With 85 out of every hundred pounds of mica virtually going to the scrap-heap and with the demand from electrical manufacturers increasing by leaps and bounds, the problem became one of life and death for the mica industry. It was solved by the development of a process for splitting the mica into very thin films and bonding them together with shellac or some other suitable binder under heat and pressure, so as to form sheets or molded shapes. In this re-

SOFTNESS and resilience of amber mica are responsible for its general use in commutators that are not undercut. It prevents sparking by wearing down evenly with the copper bars of the commutator



construction process, the small sizes of muscovite as well as of amber mica are split into films 1/1000 in. and even finer than that in thickness. This thin-splitting is done by hand in India. Although a number of mechanisms have been devised and patented to supplant manual with mechanical splitting, hand separation continues to be the chief method in vogue, it being claimed that the product is more uniform in thickness than would be possible by machinery.

This built-up mica, perfectly satisfactory in numerous electrical applications, constitutes today from a tonnage point of view the most important classification of mica products, just as India splittings, largely used in its production, are the heaviest item in our mica purchases from that country. In 1928, our total imports of mica splittings approximated 3,500,000 pounds, valued at more than $1,000,000.

IN India mica is regarded as a sort of sacred plant, a superstition fostered by the discovery of surface crystals in the soil (such as those shown above) worn away by heavy rain. Mica has served the native of India as a medicament in even deadly diseases for generations

The manufacture of built-up mica and of mica products, such as commutator rings and segments, tubing, winding and cover plates for heating devices, discs, mica cloth, mica paper, flexible sheets, tape, etc., constitutes an industry of high attainments in which American manufacturing ingenuity has been and continues to be applied with the result that precision, uniformity and general quality of products show constant progress. Foreign splittings are subjected to most careful re-inspection as they pass over slowly moving screens and finished products undergo scrutiny even to the extent of employing X-ray apparatus to detect metal particles that might have escaped the examiner's notice.

Applications of White and Amber Mica

AS a rule, muscovite sheet mica is used in insulating all parts of dynamos and motors, except for commutators of D. C. machines that are not undercut. Commutators are built up of bars of copper interlined with strips of mica. Softness and resilience of amber mica are responsible for its general use in commutators that are not undercut. It prevents sparking by wearing down evenly with the copper bars of the commutator. The best Indian ruby mica has a breakdown pressure of 18,000 volts and a specific resistance of 1200 mill. megohms, the general run of amber mica being credited with about 12,000 volts of breakdown pressure and 900 mill. megohms specific resistance. Because of its superior dielectric properties, Indian ruby mica finds some use in commutator segments. It is used for insulating segments on undercut commutators. Being hard, it does not wear down with the copper bars, thus causing the commutator to spark more or less. Condenser plates of the high-potential sort call for an especially pure grade of mica. Amber mica is credited with possessing higher heat resistance than the white variety, being unaffected by temperatures up to 1800 deg. fahr. Both muscovite as well as amber, however, find employment in the insulation of heating appliances, the white being considered safe for use where temperatures do not exceed 1000 deg. fahr. Steadily growing quantities of high grade mica find their way into high as well as low tension transformers. In the form of discs and washers, mica is used in incandescent as well as in photo-engraving and other types of lamps. In the telephone, mica is found on the carbon transmitter button which transforms the sound into electric waves.

Built-up mica is manufactured into forms suited for all types of insulation, the determining factor of whether the natural sheet mica or the fabricated, reconstructed mica is used as insulator being not so much the class of electrical products as the particular service requirements of a given piece of equipment. There are some specific uses for primary sheet mica in which other than its insulating properties cause its employment, so for instance, in sound-producing devices in which its resonance is of prime importance. At one time considerable quantities of diaphragm mica were used by phonograph manufacturers who bought high grade muscovite for the purpose. A few years ago, a good deal of the best mica sheets found its way into lamp shades, and a certain outlet lies still in this direction. Here clearness, transparency and flexibilty are the most important properties sought.

Aside from its use in molded insulation of a certain type, scrap mica in flake form is used as fireproof imitation snow for Christmas tree decoration. Finely ground, it serves in lubricant for bearings.

Mention should also be made of the fact that Brazil, Argentine, Guatemala, Transvaal and other parts of South Africa contribute, whenever the market position is favorable, important tonnages to the world supply, but India, the United States and Madagascar hold the spotlight just now.

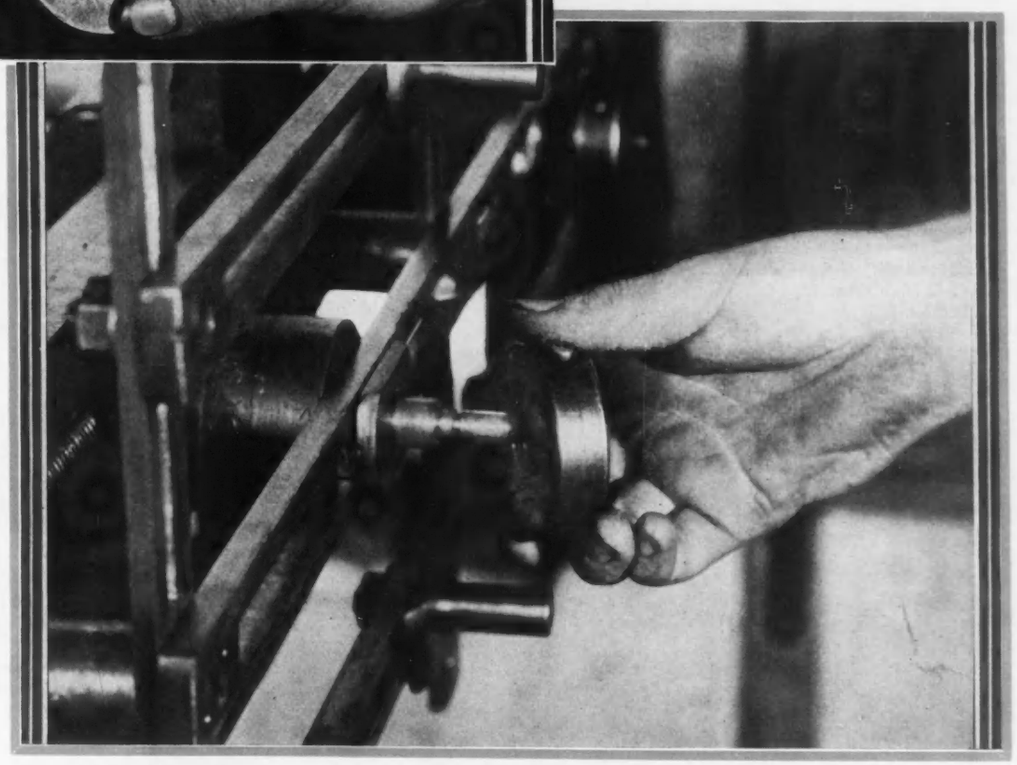
Mica Prices Have Remained Steady

OVER a range of years, mica prices have shown steadiness, sharp fluctuations having been few and far between. As the picture of the mica industry unfolds itself to the student of production, imports and price statistics, one becomes conscious that a valuable economical contribution has been made by this mineral to the progress of the electrical industry. When one takes into consideration that mica insulation has been one of the foundation stones on which the electrical industry has been built and on which it continues to expand, one can not help but marvel at the modest aggregate of the electrical industry's annual mica bill, as revealed by the value of imports and domestic production, the former in the record year of 1920 having been only slightly in excess of $3,000,000 and the latter only slightly more than $750,000 in the War year 1918. And not all of the mica covered by these figures went into electrical consumption. It is obvious that the mica industry has never taken advantage of the many praises which have been heaped upon its product's insulating merits, and when this or that consumer picks out the per pound price of a specially fine, large size of sheet mica for criticism, he displays his ignorance of the situation, for the picture, with all of the details filled in, points decidedly the other way.

Ideas Like These—

Help Roland Electric Company of Baltimore, Maryland, make a profit out of the motor repair shop business

HERE is a simple clamping arrangement that saves seconds every time a coil is wound on a standard coil winding machine, or every time a coil is removed after completed. Just press a button and pull the clamp off the shank of the coil winder

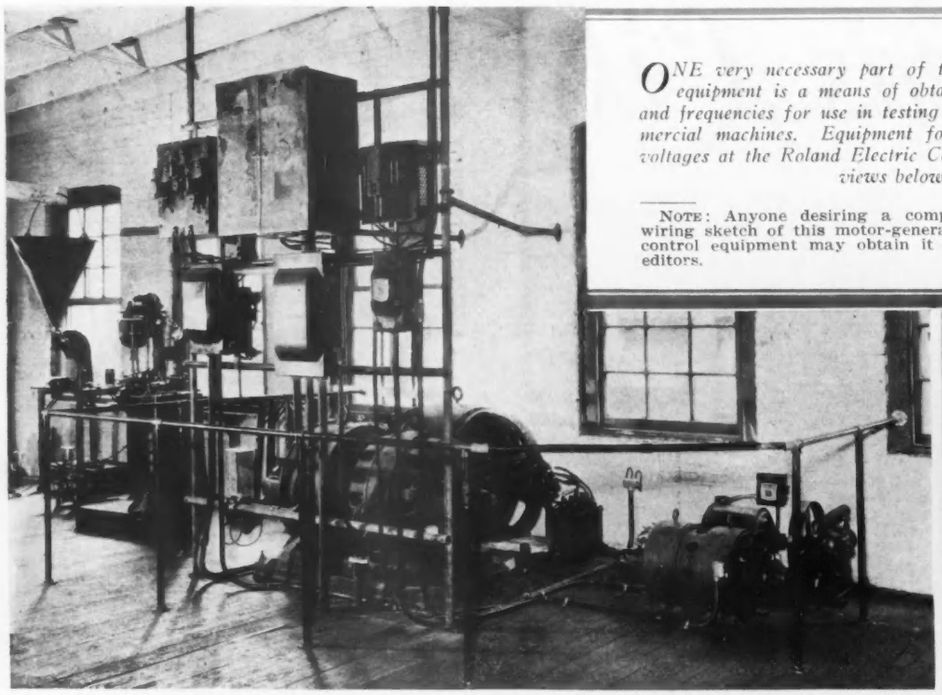


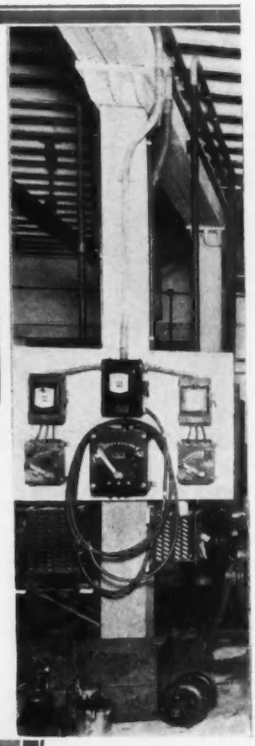
A CLOSE-UP view of the head of a standard type coil winding machine, showing how the ingenious clamp is used. The button controls a latch. When the button is down, the latch is pushed into the body of the clamp so that the hole is round and the clamp will fit on the shank

"THE secret of making a profit out of the motor repair shop business," says J. Roland Stolzenbach, President of Roland Electric Co., "is to get a steady flow of business on a time and material basis, then do the work with the most up-to-date equipment available. This equipment is not necessarily expensive. It is surprising how the efficiency of a shop can be increased by exercising a little ingenuity in building and arranging the equipment. Take the little clamp shown on this page, for instance. It is just a little addition to a standard type coil winder yet it pays for itself several times a day."

ONE very necessary part of the motor repair shop equipment is a means of obtaining various voltages and frequencies for use in testing various types of commercial machines. Equipment for obtaining these test voltages at the Roland Electric Co. is shown in the two views below

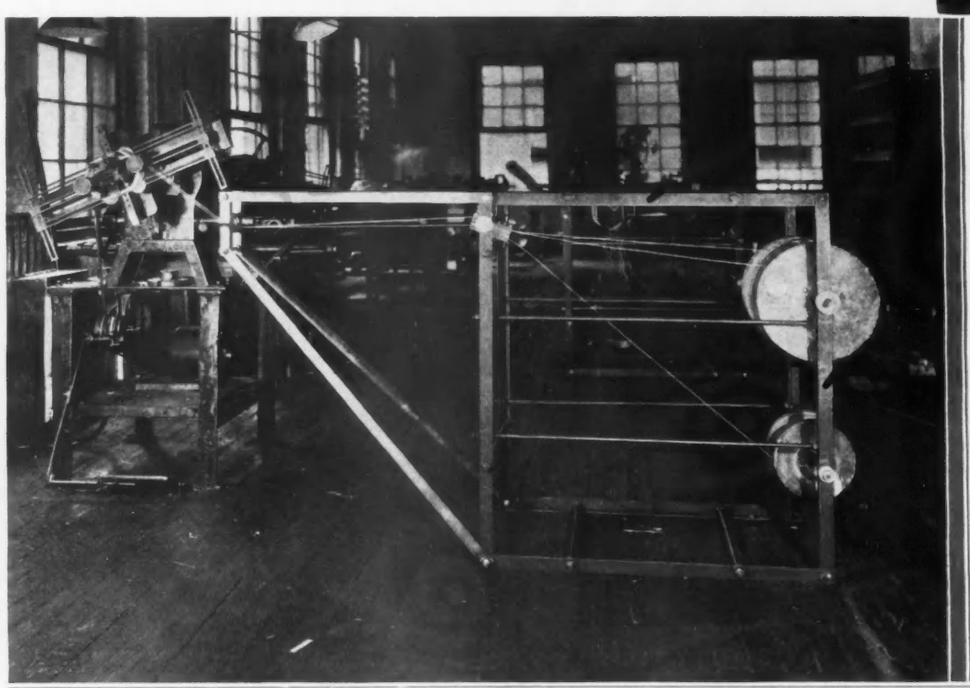
NOTE: Anyone desiring a complete schematic wiring sketch of this motor-generator layout and control equipment may obtain it by writing the editors.



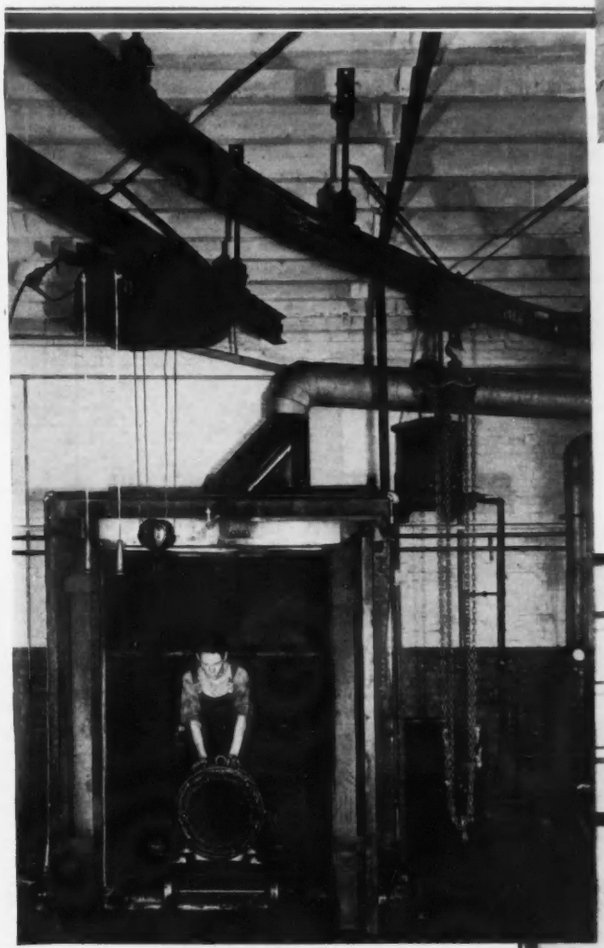


THE entire set-up (below) for winding three diamond shaped coils at once was built right in the shop of the Roland Electric Co. The body of the coil winder is a gear reducing unit with a 43 to 1 reduction. By the use of the step pulleys shown, the form spindle can be made to run at 20, 22 or 24 r.p.m. These speeds can be reduced an additional 25 per cent by the motor controller. The adjustable winding head will wind coils up to 22 in. in length and 12½ in. in width

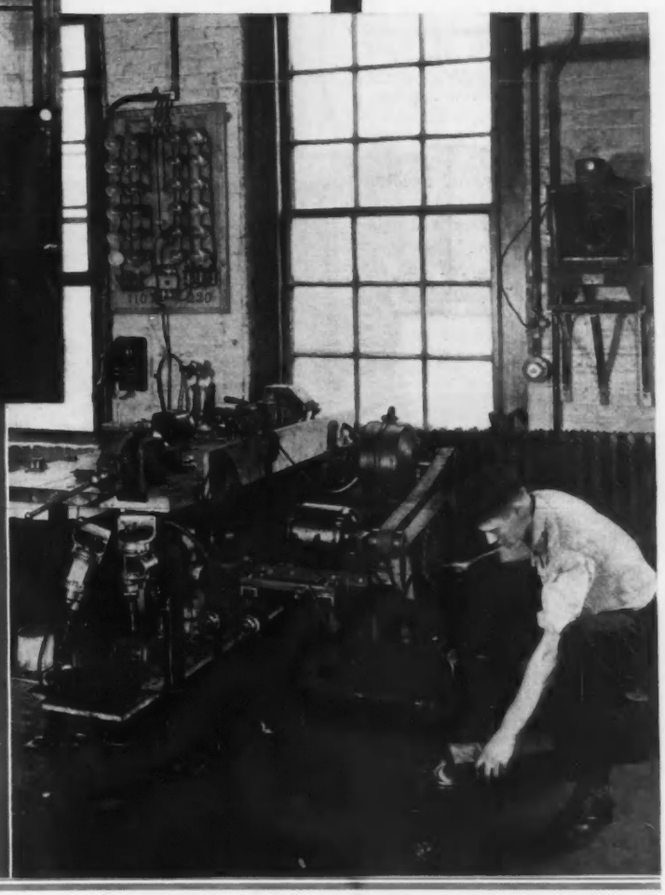
VARIOUS test voltages are obtained by the use of two motor-generator sets and a rotary converter. This equipment with automatic starters, is located on the second floor (above illustration) and is controlled from the first floor (right). The building is provided with only direct current at 220 volts. One motor-generator set furnishes 3 phase, 60 cycle current at 220 volts; another furnishes single phase, 60 cycle current at 110 volts, and the converter furnishes 3 phase, 25 cycle current



HERE is a big time saver (right) worth the consideration of every motor repair shop: a tank built in two sections with hot acid in one section and hot water in the other. It is used for eating insulation off of both wound stator and rotor coils, eating mica from commutator bars, and many other applications. Mr. Stolzenbach states it is one of the biggest time savers in the shop



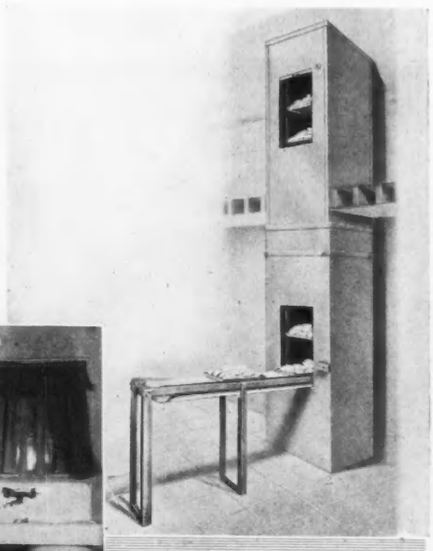
FIFTEEN people may stand with ease in this large bake-oven (above). It operates under automatic control at a temperature as high as 700 deg. Fahr. Notice the one-ton hoist used for loading and unloading the truck. Roland Electric Co. has never yet received a motor in the shop too big to bake in this oven.



RIGHT—For testing motors from 1/6 to 2 hp. a shunt motor with a short-circuited armature is used. No rheostats to dissipate the load; it is dissipated in the armature of the short-circuited machine. Different loads are obtained by inserting variable resistance into the shunt field. A 1 hp., 230 volt, 1160 r.p.m. motor is used for dissipating the load

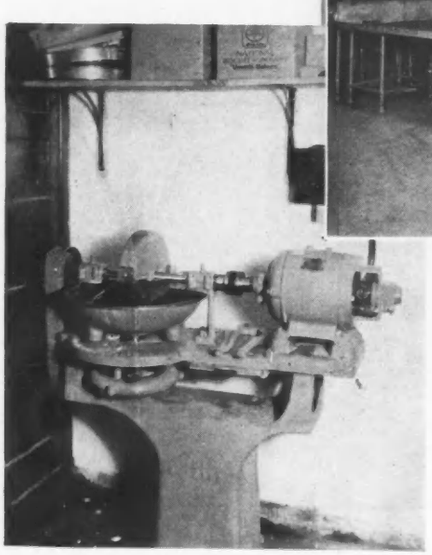
Here's a Market for "

FLOOR scrubbers use motors ranging in power from 1/12 hp. to 1 hp., but the larger proportion of motors for this use range between 1/12 and ½ hp. Many makes of floor scrubbers make use of universal motors. Brushes of scrubbers are usually direct driven through gears and operate between 120 and 1100 r.p.m.

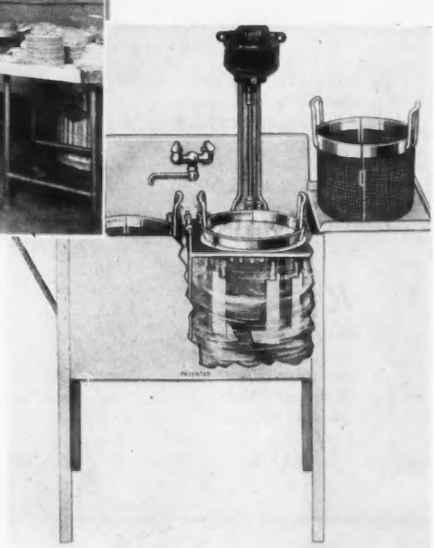


DISHWASHER sinks used in homes use motors of about ¼ hp. Split phase, reactor type motors are suitable for this application. Constant speed motors are preferred. Thus where D.C. motors are required they should be compound wound. The commercial dishwasher (lower right) uses a 2 hp. motor, 1725 r.p.m. This motor is constant speed and is coupled directly to the load by a flexible coupling. Bronze sleeve bearings are used

KITCHEN conveyor equipment (above) varies a great deal in size and design, but for this particular type motors ranging in size from ¼ to 1¼ hp. are used. These are constant speed, ball-bearing motors, totally inclosed in the case of D.C. motors and partly inclosed in the case of A.C. motors. Selective control is used, making the conveyor essentially automatic

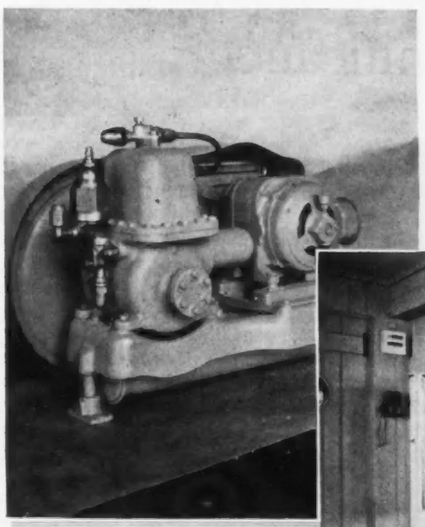


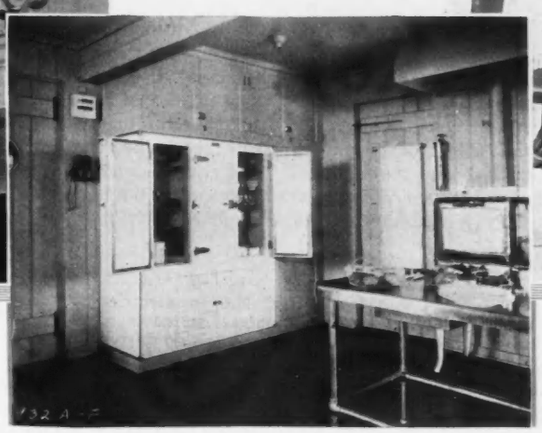
GRINDING machines (left) used in large commercial kitchens use direct connected motors of about ½ hp. These are usually open type A.C. 110 volt motors. Silver washers (right) use fractional horsepower vertical type motors. These motors should be totally inclosed

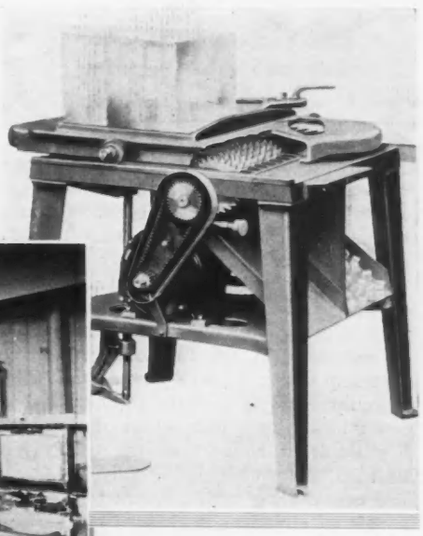


"Kitchen" Motors

THE commonest applications of electric motors in domestic and commercial kitchens for equipment not used directly in the preparation of food are for refrigerators, dish washers and ventilating fans. Other important applications shown on this and the opposite page are conveyors, grinders, floor scrubbers, ice cutters and silver washing machines



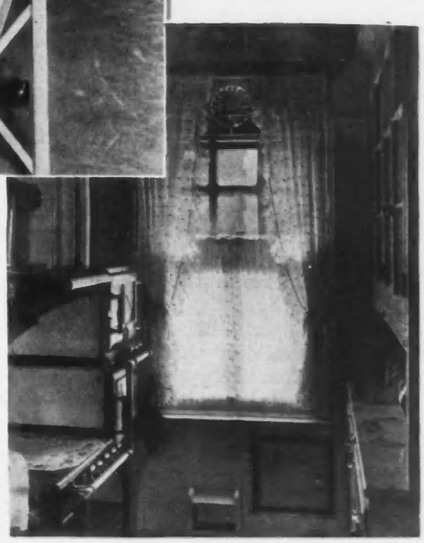




ELECTRIC refrigeration furnishes a vast market for motors ranging in size from 1/8 to 1/2 hp. Almost any type of motor can be used on an electric refrigerator, provided the machine is properly designed. First of all, the refrigerator motor must be quiet under conditions of intermittent starting and stopping. This motor should also be free of radio interference.

EITHER a 1/2, 1 or 1 1/2 hp. motor is used on the above ice-cutting machine. This is a 1725 r.p.m. machine, the speed of which varies with the load

THE kitchen conveyor shown at the left uses motors up to 3 hp. These motors drive their load through worm gears and silent roller chains, and operate at 900 to 1800 r.p.m.



VENTILATING fans used in large commercial kitchens (left) use motors up to 1 hp., but average about 1/2 hp. Small domestic kitchen ventilators (right) use motors ranging in size from 1/75 to 1/4 hp. Split phase induction motors are usually provided for A.C. service and series motors for D.C. service. Quiet operation is one of the primary design characteristics of ventilator motors

When You Buy or Sell on Trial

What is the Legal Significance?

By LESLIE CHILDS
Attorney at Law

GENERALLY speaking, contracts involving the sale of machinery that stipulate a period for trial, and that retention beyond such period constitutes an acceptance, are valid. By the same token, the courts have quite consistently held that the failure of a buyer to comply with terms of this kind renders him liable for the purchase price, on the ground that such failure amounts to an admission of the fulfillment of all warranties.

Needless to say, the foregoing rule of construction is of great importance to both buyers and sellers of machinery and equipment sold with the right of trial, and should never be overlooked in a transaction of this character. And, as an example of how the courts usually reason in cases of this kind, the following recently decided case dealing with a contract for the sale of electrical machinery is of force and value.

A COMPANY bought an electric molder. The contract stated that if no complaint was made within thirty days the machine would be considered accepted by the buyer. After thirty days the buyer said the machine did not do the things the salesman said it would do, and refused payment. The court upheld the original contract and demanded payment

Here the plaintiff, a machinery company, sold the defendant an electric molder along with some other machinery for the total sum of $6,300. The contract of sale was in writing and stipulated, among other things, as follows:

"That this contract shall not be modified or added to by any agreement not expressly stated herein, that in case of rejection of the within described machinery the buyer shall promptly deliver it in good order to seller f.o.b. cars, that a retention of the property forwarded, after 30 days from its arrival at destination shall constitute a trial and acceptance, be a conclusive admission of the truth of all representations made by or for the vendor and a fulfillment of all its contracts of warranty express or implied."

Pursuant to the above contract the plaintiff shipped the machinery and the defendant received it. The defendant made no complaint about the machinery within the 30 days stipulated for trial, nor did defendant ever offer or return same. Defendant had given purchase money notes for a large balance due on the shipment, and when they fell due payment was not made.

Instead, defendant then set up that the electric molder did not fulfill the representations made by plaintiff's salesman when the contract was entered into. Defendant contended that the electric molder was purchased for a special work, that its fitness for this work was explained to the salesman of the plaintiff before purchase, and that the contract was entered into with the understanding that the molder would do the work contemplated. That the equipment failed to perform as expected, and that plaintiff's expert mechanic was unable to correct same.

Plaintiff stood squarely upon the written contract, denied there had been any representations other than appeared in the contract, and filed suit on the notes. Further, plaintiff objected to the introduction of any alleged oral warranties made by its salesman, on the ground that they tended to vary the written contract. Plaintiff was sustained in this by the trial court upon the trial.

In addition, plaintiff demanded judgment for the further reason that the defendant had not complied with the contract in respect to notice of defects being given. So too, plaintiff relied upon the fact that the defendant had not returned the machinery within the 30 days provided in the contract. The trial court upheld the plaintiff's contentions and gave judgment on the notes. From this the defendant appealed to the higher court and here, after a review of the evidence as it has been outlined, the court in reasoning on the question presented, in part, said:

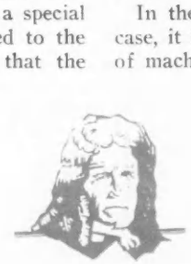
"There is no suggestion in the answer that complaint was made within the thirty days, stipulated in the contract, for a test of the machine, and it is beyond dispute that the machine was not returned to plaintiff, f.o.b. * * *, but at the time of the trial was still in defendant's possession.

"Where the contract provides that notice of defects must be given within a prescribed time or, as is the case here, that, if the machinery does not function satisfactorily, it must be returned within a prescribed time from its receipt, or else the failure so to comply with the contract will be a conclusive admission of the fulfillment of all warranties, express or implied, it is a condition precedent to the defeat of the demand for the purchase price, upon the ground of the failure of the machine or other property to comply with the warranties, that such a provision in the contract must be complied with."

Then, after reviewing the authorities and citing cases in support of the above statement, the court continued:

"The foregoing authorities clearly establish that the failure to return the machine within the time prescribed must be deemed, as provided in the contract, which is the law between the parties, a trial and acceptance of the machine, a conclusive admission of the truth of all representations made by or for plaintiff, and a fulfillment of all its contracts of warranties, express or implied. * * * The judgment is affirmed." (127 So. 649).

In the light of the facts and holding of the foregoing case, it is obvious that the terms of a contract for the sale of machinery, in which a stipulation for its return within a stated time after trial, if found unsatisfactory, appears, must be substantially complied with as a condition precedent to repudiation by the buyer. In other words, the retention of the machinery beyond the time for trial and return will be held an acceptance, and the buyer liable for the price. This is a point well worth bearing in mind for both the seller and the user of electrical machinery.



Facts, Figures and Trends

Spanish Government to Regulate Lamp Manufacture

A Royal Order, published in the *Gaceta de Madrid,* prescribes that the industry of manufacturing incandescent lamps in Spain shall be subject to the intervention of the Ministry of National Economy, and that all manufacturers at present engaged in this industry must register themselves in their respective provinces, declaring the production equipment which they possess. In order to avoid overproduction applications for establishment of additional plants for this class of manufacture are being denied. These measures are taken under the assumption that Spanish manufacturers of incandescent lamps will arrange to export a part of their production and will not raise prices to the Spanish public except in case of increase in the cost of raw materials or of labor.

Public Television Performance

On the night of Aug. 25 a radio-vision show was held in a vacant store at Fifty-seventh Street and Eighth Avenue, New York. A television receiver developed for use in the home was installed to enable passers-by to "look in" on the program, according to the New York *Times.*

The images as picked up appeared about 4 inches square and at close range could be distinguished with considerable clarity. Engineers who developed this home television receiver declared that owners of visual-broadcast receivers in the eastern United States were able to pick up last night's program. It is estimated that more than 25,000 persons in the United States have been hearing the daily test "radio-vision" programs sent out by more than a dozen television stations in the country.

Income Tax Up Again?

According to the New York *Times* of August 22, high Treasury officials admitted that they had practically abandoned hope of recommending for next year a continuance of the 1 per cent reduction on normal incomes voted by Congress last December as a temporary measure in the emergency created by the stock market collapse. One of the most serious decreases in revenue has been due to the tremendous drop in customs receipts, which in the first fifty days of the fiscal year have fallen from about $85,000,000 to about $45,000,000, a decrease of $40,000,000, as compared with the same period last year. This loss of customs receipts represents about 60 per cent of the $64,261,211 total loss of revenues to the government during these fifty days, as compared with a year ago. To just what extent the new tariff rates are responsible for this, officials said it was difficult to determine.

If the ratio of decrease should continue over an extensive period it might well mean that the government would lose up to $200,000,000 in customs receipts, which ran close to $600,000,000 in the preceding fiscal year.

Officials hope, however, that there will be a sharp upturn of industrial activity in the last half of the fiscal year.

French Imports of Electrical Equipment Increase

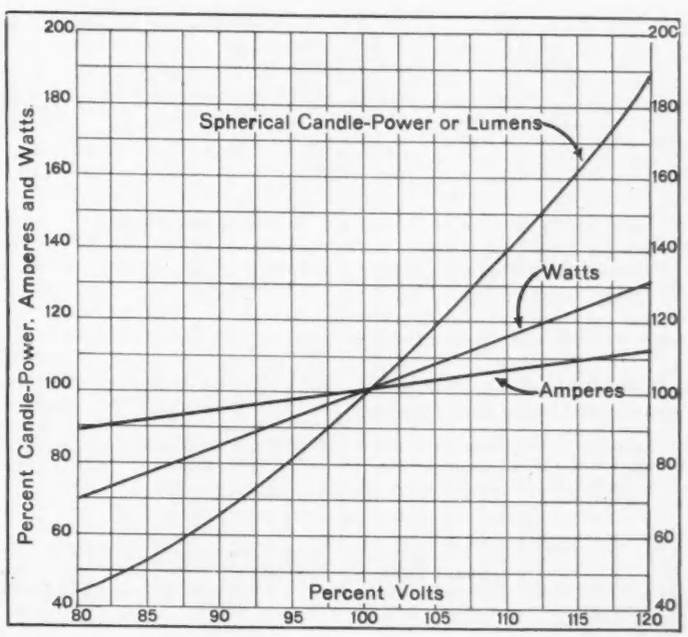
Domestic manufacturers of electrical equipment in France are taxed beyond their capacity and imports for the first quarter of this year were three times as great as the same period last year, according to a cablegram received from Acting Commercial Attache Daniel J. Reagan, Paris. Exports of such equipment remained stationary.

Output of Electricity May Double in Next Ten Years

"The best judgment is that during the next ten years, to adequately meet the requirements of the nation, the output of electricity will have to be doubled," states Preston S. Arkwright, chairman, Public Policy Committee, National Electric Light Association in his report presented at the fifty-third convention of the association held at San Francisco. "The benefits accruing to the whole national life—economic, industrial, and social—attainable from this larger use of electricity, are beyond visualization."

Retail Sales 58.6 Per Cent Cash

A Department of Commerce analysis of retail sales through 24,000 outlets finds 58.6 per cent for cash, 32.2 per cent on credit and 9.2 per cent on installment payments. Bad debts amounted to 0.6 of 1 per cent of credit sales and 1.2 per cent of installment business.



High Cost of Undervoltage Lighting

Reduce the voltage of a lighting circuit to 83 per cent of its original value, and the illumination of areas served by that circuit is cut in half. See how much steeper the spherical candle-power curve is in the accompanying graph than the curves of current and watts. What does that mean? That as voltage drops the cost of lumens rises, and rises at a surprisingly rapid rate. Lamps burned under voltage use fewer watts, it is true, but the loss of lumens is far out of proportion to the saving in watts.

2,508,151 Jobless According to Census

The Bureau of Census has just released figures to the effect that two per cent of the population of the United States fall in the classification of persons out of a job, able to work, and looking for a job. Six other classifications of unemployed yet to be reported on are:

B. Persons having jobs but on lay-off without pay, excluding those sick or voluntarily idle.

C. Persons out of a job and unable to work.

D. Persons having jobs, but idle on account of sickness or disability.

E. Persons out of a job and not looking for work.

F. Persons having jobs but voluntarily idle, without pay.

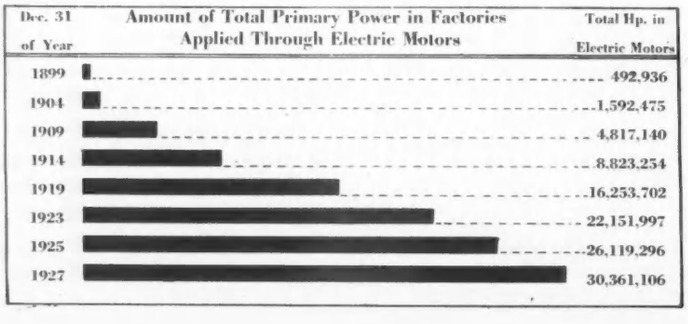
G. Persons having jobs and drawing pay, though not at work.

Commenting on these different classifications, the Bureau states that without doubt the first classification, figures for which are given in the accompanying table, would undoubtedly constitute by far the major part of the total unemployed. Following is a detailed report of able bodied persons out of work and seeking a job. The proportion of unemployed is given in per cent of total population instead of per cent of gainful workers because the latter figures are not yet available. It is stated, however, that the number of gainful workers represents about forty per cent of the total population.

State	Population 1930 (Preliminary)	Class A Unemployed	Per Cent of Population
New England			
Maine	800,056	13,244	1.7
New Hampshire	465,293	8,493	1.8
Vermont	359,092	5,419	1.5
Massachusetts	4,253,646	115,987	2.7
Rhode Island	687,232	22,193	3.2
Connecticut	1,604,711	32,192	2.0
Middle Atlantic			
New York	12,619,503	364,617	2.9
New Jersey	4,028,027	127,615	3.2
Pennsylvania	9,640,802	211,877	2.2
East North Central			
Ohio	6,639,837	168,277	2.5
Indiana	3,225,600	66,390	2.1
Illinois	7,607,684	236,926	3.1
Michigan	4,842,280	160,506	3.3
Wisconsin	2,930,282	49,780	1.7
West North Central			
Minnesota	2,566,445	47,987	1.9
Iowa	2,467,900	22,633	0.9
Missouri	3,620,961	62,031	1.7
North Dakota	682,448	5,937	0.9
South Dakota	690,755	3,600	0.5
Nebraska	1,378,900	15,440	1.1
Kansas	1,879,946	22,236	1.2
South Atlantic			
Delaware	238,380	2,741	1.1
Maryland	1,629,321	23,973	1.5
Dist. of Columbia	486,869	8,870	1.8
Virginia	2,419,471	30,355	1.3
West Virginia	1,728,510	21,396	1.2
North Carolina	3,170,287	29,114	0.9
South Carolina	1,732,567	12,226	0.7
Georgia	2,902,443	27,406	0.9
Florida	1,466,625	33,887	2.3
East South Central			
Kentucky	2,623,668	31,153	1.2
Tennessee	2,608,759	21,402	0.8
Alabama	2,645,297	21,400	0.8
Mississippi	2,007,979	10,758	0.5
West South Central			
Arkansas	1,853,981	12,591	0.7
Louisiana	2,094,496	31,444	1.5
Oklahoma	2,391,777	42,392	1.8
Texas	5,821,272	79,552	1.4
Mountain			
Montana	536,332	11,808	2.2
Idaho	445,837	6,367	1.4
Wyoming	224,597	4,245	1.9
Colorado	1,035,043	22,793	2.2
New Mexico	427,216	5,436	1.3
Arizona	435,833	7,232	1.7
Utah	502,582	9,886	2.0
Nevada	90,931	2,850	3.1
Pacific			
Washington	1,561,967	36,089	2.3
Oregon	952,691	24,849	2.6
California	5,672,009	172,556	3.0

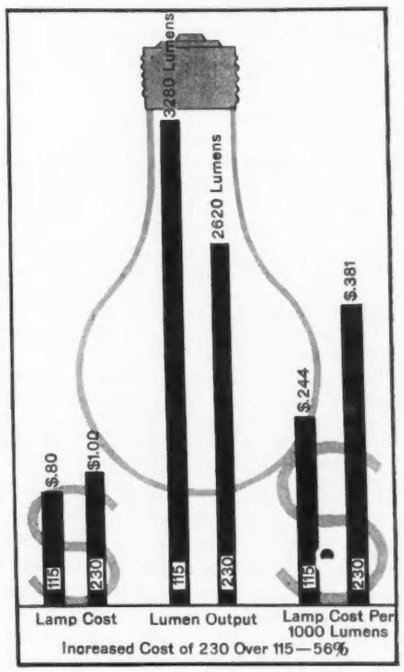
The Industrial Motor Market Grows and Grows and Grows

From insignificance to colossus is a brief history of the development of the electric motor in industry. A dot representing the primary power in factories applied through electric motors in 1899 (see chart) becomes a long line in 1927. Figures for 1929 are not yet available, but there is no doubt that they will be proportionately greater than 1927.



115 Volt Lighting Cheaper Than 230 Volt Lighting

Lamps of 220-250 volts are less rugged than those of 110-125 volts. The filament in the high voltage lamps is one-half as large as that in the lower voltage lamps of corresponding wattage, and is thus more liable to breakage. For the same power



consumption, the 220-250 volt lamp will give on an average 20 per cent less light than the corresponding lamp of the lower range (see accompanying chart). Thus 230 volt lighting costs 56 per cent more than 115 volt lighting.

35 Per Cent of Radio Dollars for Tubes

One of the amazing phenomena of the radio industry's development has been the increasing importance of its tube division. From the section of the industry which less than a decade ago manufactured less than 10 per cent of the value of the industry's total output, it today is responsible for approximately 35 per cent of radio's total manufacture. The percentage is increasing, and it is probable that before two more years elapse more than half of the millions of dollars spent for radio apparatus by the public will be invested in tubes.

Texas for Carbon Black

Texas produced in 1929 62 per cent of all the carbon black made in the United States. It more than doubled its output between 1928 and 1929, the figures being 100,828,000 and 228,183,000 pounds, adding $11,700,000 to the State's income.

Ball and Roller Bearings for Electrical Machines

(*Continued from page* 46)

(4) *Care in Assembling*—It is essential to protect the highly polished bearing surfaces against corrosion after the anti-friction bearings are removed from their shipping containers. All foreign matter, such as grit, chips and filings, must be kept out in order to prevent excessive wear and noise. It is therefore recommended not to unwrap anti-friction bearings until they are ready for assembling. Unwrapped bearings should be placed on clean paper and never on work benches, where they are bound to pick up chips or dirt. For the cleaning of anti-friction bearings light oil or gasoline is recommended. If cleaning in this manner does not result in a bearing which spins freely without sticking, then it is not advisable to use the bearing. It should be returned to the manufacturer for reconditioning.

Hammers, drifts or chisels should never be used when assembling anti-friction bearings. Suitably designed housings and proper assembling and dismantling tools will eliminate possible damage to the bearings when handling them.

(5) *Correct Lubrication*—The purpose of lubricating anti-friction bearings is twofold. In the first place, the lubricant must protect the highly polished surfaces of the rolling elements and raceways against corrosion, and in the second place, the lubricant should reduce to a minimum the possibility of the development of internal friction between the rolling elements and the raceways as well as between the rolling elements and their retainers.

Both oil and grease are satisfactorily used for anti-friction bearings in electrical machinery. Excessive amounts of lubricant are unnecessary and detrimental, since they cause temperature rise and leakage through the shaft seals. Pressure fittings are therefore undesirable for electrical anti-friction bearing installations.

Grease lubrication can be recommended for medium speed installations. As long as there are no excessive temperatures, grease will provide a better seal against lubricant leakage and the entry of dirt, grit and moisture than oil.

For higher speeds, oil is preferable. Light or medium oils should be used and careful provision should be made in the housing to prevent overfilling. For horizontal shafts it is only necessary to have the lowest rolling element submerged to approximately its center. For high speed motors, drop feed lubrication is recommended in preference to partial submergence, in order to avoid churning of the oil with consequent heating.

Roller bearings usually require heavier oils than ball bearings and for bearings supporting heavy thrust loads steam cylinder oil is frequently used.

Lubricants for anti-friction bearings should contain a minimum of free fatty acid and free alkali. They should be free from fillers and should not melt, gum or decompose at the temperatures prevailing in service or when standing for a protracted period of time.

He's a "Stickler" for Good Finishes

(*Continued from page* 52)

rapid change in styles and finishes, is a very flexible department, and must be continually on its toes.

Speed of application and drying speed are such vital points in continuous production that quick drying lacquers and enamels are a necessity in finishing.

As a result of development work by enamel and lacquer manufacturers and leading industries using these finishes, it is now possible to employ lacquer and quick drying enamels successfully for many purposes for which only a short time ago it was not thought the proper finish. They are highly resistant to moisture, and preserve metal surfaces from rust, corrosion and tarnishing. The film deposited is very hard and resistant to scratching or wear of any kind. Surfaces so treated do not collect dirt readily, and can be easily washed with soap and water without harmful effects to the finish. The versatility of this type of finish —it can be applied either as a clear, pigmented, gloss, dull or semi-gloss coating—should not be overlooked. One producer of a small electric hand grinder gives all grinders a coating of clear lacquer before they leave the shop, just to retain the brightness and appearance of the buffed metal beneath.

Synthetic resins have been developed to such an extent that there are finishes, recently developed, which are particularly suitable for covering surfaces that are ordinarily difficult to coat—such as aluminum and galvanized iron. Tenacious adhesion is one of their outstanding properties. They produce a smooth, easily cleaned surface, unusually resistant to abrasion, resistant to all mineral oils, and when baked, to their fractions—gasoline, kerosene, fuel oil, etc. They withstand temperature in excess of 600 deg. Fahr. and have a higher dielectric strength than many commonly used paints. In the electrical industry they are used effectively in manufacture and maintenance of both direct current and alternating current apparatus, storage battery equipment, motors of either type (for sealing the housings against the entrance of dust and leakage of oil), and on various other equipment.

Many heavy equipment manufacturers are using paint extensively on castings, prior to machining. All castings, after receiving the rough cut, are immediately painted a white, gray, or other light color. Three reasons are advanced—prevent rust—assure cleanliness—and aid accuracy.

Ingersoll-Rand goes further. Test blocks are painted bright colors, as are the compressors placed on them to be tested. The assistant manager at Painted Post, N. Y., gave the writer a graphic illustration of results. Two blocks side by side, one unpainted and oily, the other bright and cheery. The same applied to the compressors on them. Even disregarding the factor of light reflection in helping the test operators do an accurate job, we always get better results on the painted blocks and engines.

Spray booths, as part of your finishing equipment, are shown in the photographs which accompany the article. Regarding the care with which engineers purchase electrical equipment, a point in case well illustrates their view. One sales research engineer informed the writer that their policy is to make every piece of machinery as attractive as they possibly can. When the body of a machine is composed of various parts, the finish is applied so as to make the shell look as though it were one continuous casting. And even though a standard color—such as the machine tool manufacturers gray—means less expense and production trouble, blues, reds, light grays, whites, greens and other striking colors are encouraged. They have sales appeal—they take the product from the class of ordinary workmen into the class of good, progressive attractive workmen. Many companies are developing their own colors for all of their machinery.

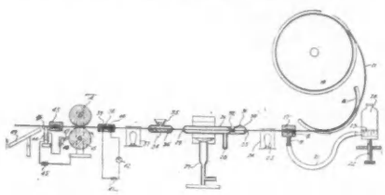
Electrical Patent News

Here are collected in condensed form a few of the outstanding recent patents of electrical devices

By RAY BELMONT WHITMAN
Patent Attorney

Electrical Resistance and Formation of the Same

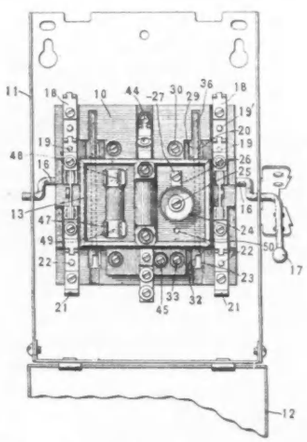
1,771,055. Harold Pender, Merion, Pa. 16 Claims. An electrical resistance which consists in applying to the surface of a non-porous, non-conducting, heat resistant fiber a fluid film containing minute parti-



cles of carbon and a material adapted when baked at suitable temperatures to form a conductive substance filling the interstices between the carbon particles, and then baking the fiber at suitable temperature to form a conductive coating of substantially uniform continuity.

Electric Switch

1,771,214. Benjamin E. Getchell, Plainville, Conn., assignor to The Trumbull Electric Manufacturing Co., Plainville, Conn. 3 Claims. An electric switch including an insulating base having a transverse recess at the rear and a longitudinal groove intersecting this recess and open at its ends toward the front of the base, a pair of stationary contacts secured to the base and having contact jaws in the

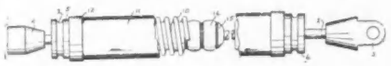


opposite ends of the groove, circuit terminals secured to the base and connected respectively to one of the contacts of each pair of contacts, fuse terminals secured to the base at the front and electrically connected respectively to the other contacts, an insulating bar slidable in the groove between the jaws of the respective pairs of contacts and a connecting member carried by each end of the bar and adapted to connect the jaws of the respective pairs of contacts and an operating member movable in the recess and co-acting with the bar.

Copies of any of the patents cited may be obtained by sending 15 cents to the Patent Editor, in care of ELECTRICAL MANUFACTURING, for each copy wanted.

Flexible Conduit

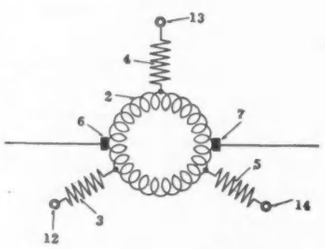
1,772,453. Frederic M. Bosworth, Cleveland, Ohio, assignor to The Midland Steel Products Co., Cleveland, Ohio. 14 Claims. A flexible conduit comprising alternate units having convex surfaces and alternate



units having concave surfaces engaging each other and having areas of contact intersecting at least the plane of curvature of the conduit in circle whose centers lie in the circumferences of each other.

Alternating-Current Motor

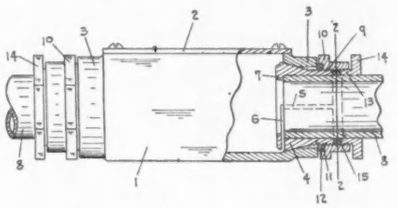
17,742. Hans Weichsel, St. Louis, Mo., assignor to Wagner Electric Corp., St. Louis, Mo. 18 Claims. The method of operating a motor which carries variable



load at synchronous speed, producing between the stator and rotor near synchronism a substantially unidirectional synchronizing torque and causing this torque to lock the motor in synchronism.

Conduit Fitting

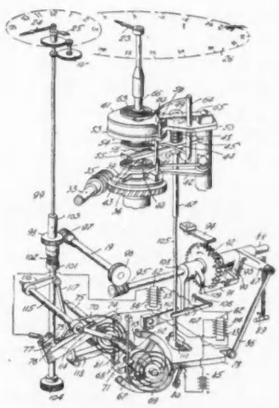
1,772,537. John William Cox, Erie, Pa., assignor to Erie Malleable Iron Co., Erie, Pa. 2 Claims. This patent covers a conduit fitting consisting of a body having an opening; a contractible longitudinally slitted sleeve in the opening having a wedging surface engaging the walls of the opening and a



screw thread; a nut having a screw thread operating on the sleeve exerting thrust with relation to the body to force the sleeve along the opening, the nut and the thread extending beyond the end of the sleeve; a follower screwed into the screw threads in the nut; and a gasket between the follower and the end of the sleeve.

Electric Clock

1,772,556. Arthur F. Poole, Ithaca, N. Y., assignor to Poole Manufacturing Co., Inc. 28 Claims. In an electric clock the combination of a vibrating member, elastic means controlling the time of vibration of



this member, and electrical means controlled through the member and operable to periodically wind the elastic means in synchronism with vibrations of the vibrating member, and maintain the member in vibration.

Why *not* PROFIT

by what 200 manufacturers would tell you about embedded* type *heating units?*

FROM your standpoint, these far-sighted manufacturers know what they are talking about. They have been through the experimental stages, made tests. And then found it more economical all around, to adopt Chromalox units—for good.

Built to FIT Your Products

Certainly it's sound business to profit by what they've learned about Chromalox units: How they are built to last; to fit the product itself; to give the right heat. In short, to keep the product operating as it should, for a long time. The patented Chromalox construction of a resistor hydraulically embedded into a heat-conducting, insulating material—makes all this possible.

Lower Assembly Costs

Customers, call us in to help with the final design of their products, to show them the right way to build in the heating units. As a result, assembly costs are lowered. Chromalox units are designed to FIT the product.

Chromalox-equipped Products STAY SOLD

Most of the guess work about your product doing a real job can be easily eliminated by using Chromalox units. Automatically, kicks and come-backs are side-tracked when you use these trouble-free units—another important point those manufacturers will tell you about.

But What About Your Products?

Whether you are working on a new product or improving an old one, we can be of valuable help to you with experience gained from years of working with leading companies making all kinds of electrically heated equipment. When you write for the Chromalox bulletins, tell us about the appliances or heating devices you want properly heated. There's no obligation!

Boiled down to a few words, this is what they'd say . . . .

"Frankly, it is simply a waste of time and money to try to make heating units when it's so easy to buy Chromalox units — really made to fit your products."

Write for your copy of these 8-page bulletins showing dozens of sizes and ratings of the largest complete line of heating units.

*Having the resistor embedded in refractory material under hydraulic pressure and baked at red heat.

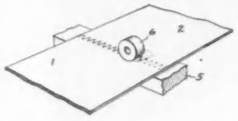
Chromalox

ELECTRIC HEATING UNITS

Manufactured Exclusively by... Edwin L. Wiegand Company, 7530 Thomas Blvd., Pittsburgh, Penna.

Electric Welding

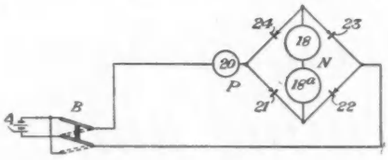
1,773,068. Jacob J. Vienneau, Pittsfield, Mass., assigner to General Electric Co. 7 Claims. The method of joining two sheets of material which comprises cutting matched teeth in the abutting edges of the sheets, placing the toothed edges of the sheets together with the teeth in mesh to form



a joint and uniting the sheets by applying heat and pressure progressively along a zone common to both sheets and wide enough to include the teeth of each sheet to press the edge portions of the teeth of one sheet into and integrally unite them with the edge portions of the teeth of the other sheet.

Electrical Apparatus

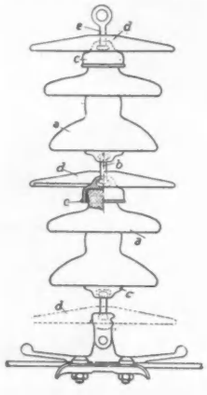
1,771,212. Paul H. Geiger, Wilkinsburg, Pa., assignor to The Union Switch & Sig-



nal Co., Swissvale, Pa. 13 Claims. A relay having a neutral magnet and a polarizing magnet, a circuit for these magnets, means for supplying current of one polarity or the other to this circuit, the circuit having two multiple paths, etc.

Electric Insulator

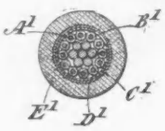
1,772,947. Gottfried Hoffmann, Ennetbaden, Switzerland, assignor to Motor-Columbus Aktiengesellschaft für Elektrische Unternehmungen, Baden, Switzerland. An insulator string having dumb-bell shaped members linking the insulating units of the string together, ring-shaped protective members, the opening being of a diameter greater than that of the



heads of the dumb-bell shaped members to permit passage of the heads, annular flanges carried by the dumb-bell shaped members and disposed between the heads, the peripheries of the flanges being adapted to contact with the peripheries of the openings of the protective members, and weld connections between the flanges and protective members.

Flexible Electric Conductor

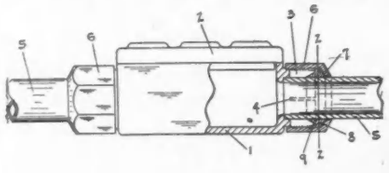
1,771,120. Philip Vassar Hunter and Harold John Allcock, London, England. 6 Claims. A method of making a flexible multi-strand insulated electric conductor comprising introducing a resin containing



substance between the conducting strands and the insulation to space the strands and insulation, and thereafter replacing the resin-containing substance by a displaceable impregnating compound so as to permit expansion of the strands in a radial direction.

Conduit Fitting

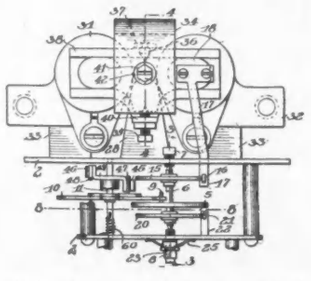
1,772,536. John William Cox, Erie, Pa., assignor to Erie Malleable Iron Co., Erie, Pa. 1 Claim. In a conduit fitting, the combination of a body; devices connecting the body with a conduit comprising a contractible axially slotted sleeve; a flanged nut on



the sleeve, the flange forming a gasket receiving recess, the nut extending along the sleeve beyond the bottom of the slots; and a gasket between the end of the sleeve and the flange on the nut.

Electric Clock

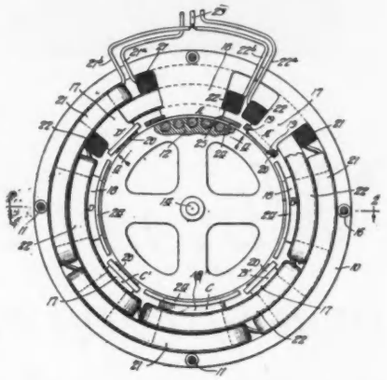
1,772,555. Arthur F. Poole, Ithaca, N. Y., assignor to Poole Manufacturing Co., Inc. 17 Claims. In an electric clock or the like, an oscillating control element, a spring connected to this element for securing regular oscillations, polarized electromagnetic means for varying the influence of the spring upon the element, a source of



electrical energy, a condenser, and circuit means including the electromagnetic means, the source of energy, and the condenser, and rendered effective automatically through the oscillations of the element for causing surges of current through the electromagnetic means in opposite directions, alternately, in a manner to vary the influence of the spring upon the element and thereby maintain the element in oscillation.

Alternating-Current Motor

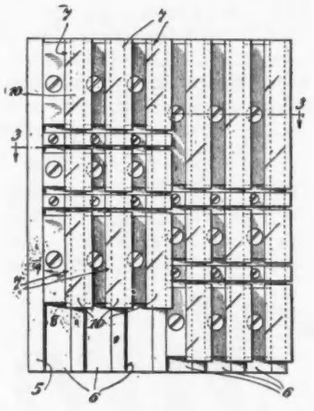
1,770,905. Edward L. Barrett, Chicago, Ill., assignor to Utah Radio Products Co., Chicago, Ill. 13 Claims. A reversible alternating-current motor comprising in combination a magnetic field structure having a plurality of permanently shaded and unshaded pole sections arranged alternately with respect to each other, an armature



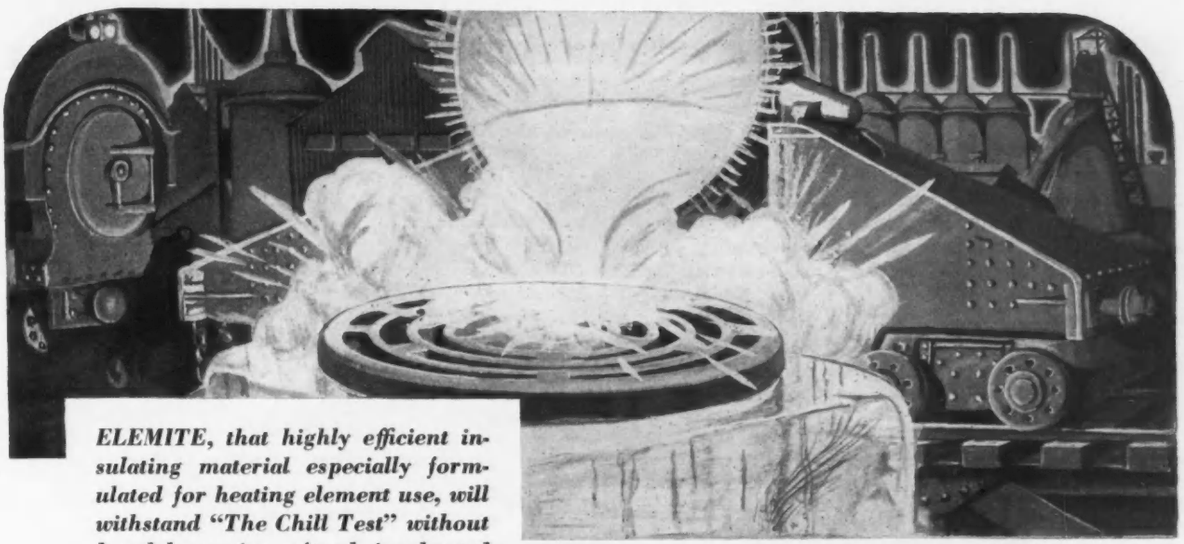
mounted for induced rotation in this structure, means for energizing adjacent shaded and unshaded pole sections in pairs to provide shaded energized pole units for inducing rotation of armature in one direction, and means for energizing adjacent shaded and unshaded pole sections in an opposite arrangement of pairs to provide oppositely shaded energized pole units for inducing rotation of the armature in the opposite direction.

Commutator

1,772,477. Arthur G. Blair, Yonkers, N. Y., assignor to Norton-Blair-Douglass, Inc. 4 Claims. A conductor segment for electrical commutators of Z-shaped cross-



sectional form comprising an intermediate web, an attaching flange projecting from one side of an intermediate web, and a brush-engaging flange projecting from the opposite side of the web, and the latter flange at its ends projecting beyond the end edges of the intermediate web.



ELEMITE, that highly efficient insulating material especially formulated for heating element use, will withstand "The Chill Test" without breakdown; i.e., after being heated to a cherry red, it can be instantly immersed in iced water without fear of its structure cracking.

The Chill Test

INSULATION for electric heating appliances and apparatus should above all, *be flexible.*

In structure, it must be capable of expanding and contracting with temperature changes, no matter how suddenly such changes take place. To provide ample insulating value, electrically, its structure should not be extremely porous. Summarized, the material used in this important service must be a *Heat Insulator* and an *Electrical Insulator* as well.

ELEMITE offers these very characteristics. It insures the life and satisfactory performance of any heating element. It will not fail in service, regardless of normal abuse. In daily service on millions of nationally popular appliances, ELEMITE is proving an inexpensive investment. It is formed in special shapes to fit the individual needs of countless appliances and apparatus.

¶ Appliance and Apparatus manufacturers are invited to bring their insulation problems to *Louthan Engineers.* Samples of ELEMITE for testing gladly furnished upon request. Submit model or sketch for price estimates.

WORTHY INSULATION

for WORTHY APPLIANCES and APPARATUS

THE LOUTHAN MANUFACTURING CO.

CERAMIC SPECIALISTS — Elemite — ESTABLISHED 1901

EAST LIVERPOOL - OHIO

Exporting to Argentina

(*Continued from page 49*)

alternating current of both 50 and 60 cycles, while Charcas, Flores, Posadas, Pozo, and some other small places have alternating current of 25 cycles; Mercedes (Buenos Aires) supplies both 42½ and 50 cycles. According to latest data available about 80 plants are supplying alternating current, and the balance direct. Voltages are almost all 220, though a few supply 110. In Buenos Aires both direct and alternating current are available.

As a general rule buildings in the Argentine are of stone or brick construction, with little fire risk, and there are no governmental regulations or anything that corresponds to the American Underwriters' Laboratories. Inspections are made by the lighting companies, and wiring in most new buildings is by rigid conduit. American thick wall enameled rigid iron conduit is preferred. Rubber covered wire is not required, but is in general use.

Screw sockets are of the Edison type, but with continental thread, which makes it difficult to sell American-made lamps. Sockets are usually of the two prong type, and fuses are Edison screw type, with longer plug body than we use, allowing them to be used in the German type box.

Most of the European manufacturers have their own representatives in the Argentine, or sell to one importer or distributor exclusively. This system has also been followed by American manufacturers of electrical equipment.

Electrical and engineering knowledge being a necessity for successful representation, and large stocks usually being carried in the country, the trade is mostly in the hands of the large companies, and small manufacturers will probably find it most satisfactory to ally themselves with these larger firms if possible, or perhaps find some British, German or Argentino importer who will handle a non-competitive American line.

Argentina is one of the countries where it is particularly important to register your trade mark, to prevent its registration by someone else who may reserve the right to its use and involve you in complications. The matter of registration of trade marks in Argentina—and in fact in most Latin American countries—cannot be too strongly stressed.

Having produced a satisfactory piece of electrical equipment, you advertise it largely in the United States, which

United States Exports of Electrical Apparatus to Argentina for 1929

From unpublished figures supplied by the Department of Commerce

(subject to revision)

Generators, D.C. under 500 kilowatts	$ 47,411	Electric washing machines	$ 18,074
Generators, D.C. 500 and over	1,330	Vacuum cleaners	19,105
Generators, A.C. under 2000	9,497	Other motor driven devices except tools	46,133
Generators, A.C. over 2000	None	Electric flatirons	62,635
Steam turbine generator sets	9,982	Electric cooking ranges	17,456
Accessories and parts for generators	19,662	Other domestic cooking and heating products	51,567
Self contained lighting outfits	129,698	Industrial electric furnaces and ovens	5,657
Flashlight batteries	325,570	Therapeutic apparatus, etc.	99,025
Radio "B" and "C" batteries	218,601	Radio transmitting sets and parts	208,372
Other dry and wet cell primary batteries	526,625	Radio receiving sets	669,484
Storage batteries	380,443	Radio tubes	213,023
Power transformers 500 k. v. amp. and over	99,321	Radio receiving set components	416,129
Distribution transformers less than 500 k.	136,160	Loud speakers	194,785
Instrument transformers	6,401	Other radio receiving set accessories	73,738
Other transformers	61,573	Telegraph apparatus	6,741
Complete battery charges under 15 amps.	14,490	Telephone instruments	7,421
Rectifiers double current and motor generators and converters	47,341	Telephone switchboards	3,807
Switchboard panels, except telephone	40,366	Other telephone equipment	98,781
Switches and current breakers over 10 amps	83,765	Railway signals, switches and attachments	3,481
Fuses and fuse blocks	32,935	Bells, buzzers, annunciators, etc.	7,542
Watt-hour and other measuring meters	22,464	Spark plugs	65,448
Electrical indicating instruments	14,759	Other starting, lighting and ignition equipment	11,566
Electrical recording instruments	22,119	Insulating material	31,407
Other electrical testing appliances	14,234	Metal conduit, outlets and switch boxes	272,558
Lightning arresters, choke coils, etc	21,791	Sockets, receptacles and lighting switches	192,960
Motors 1/3rd h.p. and under	114,887	Interior lighting fixtures	86,797
Motors over 1/3 and under 1 h.p.	46,663	Street lighting fixtures	22,627
Motors 1 to 200 h.p.	768,166	Other wiring supplies and line material	59,154
Motors over 200 h.p.	3,600	Other electrical apparatus not especially covered by other items	511,482
Station and warehouse electric trucks	11,144	Rubber and friction tape	48,118
Starting and controlling equipment for industrial motors	17,786	Globes and shades for lighting fixtures	11,302
Starting and controlling equipment for railways and vehicles	2,846	Electrical glassware except for lighting	14,727
Portable electric tools except automotive	52,709	Electrical porcelain for less than 6600 v.	60,858
Automotive electric machine tools	3,044	Electrical porcelain for 6600 v. and over	20,189
Accessories and parts for motors	116,853	Electrodes for electric furnaces	1,801
Electric fans	212,042	Other carbon products	8,211
Electric lamps, metal filament	101,297	Insulated iron or steel wire and cable	28,909
Other electrical lamps	6,062	Copper wire (bare)	605,707
Flashlights	108,603	Insulated copper wire and cable	406,602
Searchlights and projectors	26,965	Refrigeration sets up to ¼ ton capacity	388,239
		Refrigeration sets over ¼ to 1 ton capacity	55,167
		Total exports of electrical products as above	$9,027,055

SYNTHANE
Laminated Bakelite

USED BY

TELETYPE CORPORATION*

You, like the Teletype Corporation, will secure the same satisfactory results by using Synthane, THE uniform laminated Bakelite.

In making the TELETYPE (Telephone Typewriter), a machine which sends and records typewritten messages over telephone wires, this company uses Synthane because of its uniform quality and absolute dependability—prime factors for unfailing performance.

Synthane has exceptionally low moisture absorption. It does not warp, distort or swell. It is thoroughly laminated and completely homogeneous. It drills and taps easily without chipping or cracking. No cold flow. Absolutely uniform in high dielectric strength, low surface leakage, easy machineability, structural strength, dimensional accuracy and appearance. Sheets, rods, tubes, fabricated parts. Immediate shipment.

We will gladly send you samples for testing. You, like Teletype, will be more than satisfied with the results.

*TELETYPE CORPORATION—

uses Synthane in the TELETYPE. As its operation is dependent upon the proper functioning of delicate electrical apparatus any failure of insulating material would stop the machine. A flat plate of thin sheet Synthane is used as an insulator under a condenser and mounted in the unit. Synthane tubes and rods are used for bushings to insulate mounting screws from live members. Synthane fulfills the underwriter's requirements for a primary insulation . . . Linen base Synthane Stabilized Gear Material is also used in their instruments.

SYNTHANE
CORPORATION OAKS · PENNA

NEW YORK, CHICAGO, CLEVELAND, ST. LOUIS, LOS ANGELES, SAN FRANCISCO

Sheets, Rods, Tubes, Fabricated Parts

advertisement filters through the press to the Argentine. Seeing a possibility of selling your product as a result of the publicity obtained, some local commission agent in Buenos Aires gets in contact with you and applies for the selling rights for his country.

Being busy putting across your American campaign you possibly give little consideration to the foreign enquiry, or the potentialities of the Argentine market. You think you may as well pick up a little business on the side and say, "If the Argentino can get some orders, let's give him a chance."

Seeing the possibilities for trade, the agent—to protect himself more than you—registers the trademark of your particular product in the Argentine, possibly with no improper motive in mind. Later—a year, two years, five years later—you decide that as the Argentine trade is becoming important you will open your own office there, or for some other reason a change of agents seems desirable. It is only then that you discover that he has registered your trade mark in his own name and that you have no longer a right to its use in the Argentine, or the power to prevent his manufacturing—or securing from some competitor—an inferior product and marketing it under your trade mark. Also you have no power to take action against any infringer except with his consent and in his name.

Registration of your mark, therefore, should precede the appointment of an agent, or there should be a written agreement that the trademark rights will be turned over to you on application.

Cases have occurred where manufacturers have been faced with the necessity of buying their own trade mark from their foreign agents, or abandoning its use in the country.

It is considered in the Argentine that, so far as property rights are concerned, a trade mark that has not been registered does not, in fact, exist.

Do Not Forget Trade Mark Registration

In your efforts to conform to various new shipping, packing and documentary regulations; familiarizing yourself with different methods of quotation of prices and discount; computing exchange, etc., do not forget the importance of the matter of trade mark registration and give it consideration before shipping goods or appointing an agent.

You can secure details regarding trade mark laws of every country on application to the Bureau of Foreign and Domestic Commerce, or you can consult the Exporter's Encyclopædia, or the Electrical Association.

The importance of Argentina's trade cannot be overestimated. The people are progressive and enlightened, and whether they are buying everyday necessities, or expensive luxuries, there is probably no country in South America that can better qualify as a ready market.

During the past 50 years there have settled in the Argentine over 2,000,000 Italians, 1,150,000 Spaniards, over 200,000 French, 70,000 Austro-Hungarians, 50,000 Germans, 30,000 Swiss, and 21,000 Belgians, and other nationalities sufficient to make a total of over 4,000,000. These foreigners, and their descendants, call for the same class of goods as they had in their own countries.

Prior to the war our sales to the Argentine were comparatively unimportant, and it was only on the outbreak of hostilities that we made concerted efforts to secure trade which had been in the hands of the warring nations. Like a ripe apple it fell into the hands of the rag-tag and bobtail sent to secure it. Salesmen hastily commandeered were careless, and in some cases unscrupulous, with the result that the United States obtained a bad name, which still remains in some cases as an unfortunate aftermath.

Since the end of the war the class of men we have been sending to the Argentine has improved in caliber so that we are now gaining a satisfactory business standing, and our salesmen have every prospect of strengthening mutually profitable relationships.

A Large Marketing Opportunity in Argentina

We are selling to the Argentine in increasing quantities but we ought to sell more than we do. The country is rich and prosperous; its per capita wealth is exceeded by few other countries; Buenos Aires is the sixth city in the world, and it is estimated that the annual per capita consumption of imported goods is from $45 to $50.

Any American manufacturer entering this market should carefully investigate conditions before doing so. He must expect his first few years to show little profit—in fact it is probable that losses will result for some time, perhaps for several years—but the potentialities of the market are attractive, the electrical trade is constantly increasing, the opportunities are intriguing, and it may safely be estimated that the future profits will offset temporary losses in getting established, provided the manufacturer's marketing is planned after careful consideration of every angle.

The establishment of your export policy in regard to your trade with the Argentine is all important, and this cannot be done until you are fully familiar with conditions existing in the country and the character of the people. The more carefully your preliminary survey is made, the more probability there is of success.

In my next article I will give you some particulars of our trade with Chile, also an important Latin-American market for electrical goods.

A Correction

BEGINNING on page 42 of the August number of ELECTRICAL MANUFACTURING, there began an interesting and instructive article entitled, "Arc Welding Adds Strength," and contributed by A. F. Davis, Vice-President, Lincoln Electric Company.

The author has called attention to an error he made in his manuscript and feels that "in justice to the steel casting concerns of the country who are building high grade castings, a correction should be made."

In the fifth from last paragraph on page 44 of the August issue appear the words "cast steel." Cast iron should have been the words used. And again in the last sentence of the third from last paragraph on this same page the word iron should be substituted for steel.—*The Editors.*

The Human Side of Corporations

HERE are two instances of the consideration which large corporations of today show for their employees. The Edison Lamp Works of General Electric Company was transferred from Harrison, N. J., to Nela Park, Cleveland. Some employees had local associations so deep-rooted that they found themselves unable to make the move. So a G. E. advertisement appeared in the New York *Times* telling local concerns of their opportunity to secure efficient employees trained in accounting, research and statistical work, all of whom had General Electric's unqualified recommendation.

Again: In consolidating its manufacturing operations at Detroit, the United States Rubber Company found it necessary to close a number of outlying plants. Besides giving the workers a month's notice and paying them a generous dismissal wage, the entire resources of the employment department were placed at the employees' disposal to help get new jobs.

Less Costly Picking Up and Putting Down

ALL tools used in regular production work should be prepositioned whenever possible, according to R. M. Blakelock of the General Electric Company. By this is meant that they should be placed in suitable holders after use each time, the holder designed to allow rapid release, and also permit the tool to be grasped in the position in which it is desired to hold it when in use.

This is a point which might well be borne in mind by many another manufacturer who would cut his production costs and increase his output per man.

WHY CALL A SPECIALIST?

Why does a doctor consult a specialist? And why do banks and other public institutions engage accountants to audit their books, when they are already paying salaries to their own bookkeepers?

The answer is simple. Doctors and banks recognize the value of specialists whose knowledge and experience enable them to get at the inside of things quickly and accurately.

The same thing applies to chromium plating. What plater has the opportunity of drawing, as we do, on experience in dozens of plants having every conceivable kind of plating problem? Every plant we install or service adds something to the fund of experience which is available to us to draw on in meeting your problems.

Every plating plant presents different problems. The answer in each case can be found only through a special study of conditions existing in that plant. Ours is an individual service, rendered in every case by chemical engineers of recognized standing in the plating field, and worked out to meet your particular needs.

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What's NEMA Doing?

A department covering activities of the divisions, committees and sections of the National Electrical Manufacturers Association

NEMA Executive Committee Meets

At a meeting of the Executive Committee of NEMA on July 25, a number of subjects of general interest were discussed. Following is a summary of some of the actions taken:

The Committee voted that attention of Section Chairmen be called to the fact that Section "executive committees" carrying interim or executive functions are not authorized by the Constitution, By-Laws or Organization and Working Rules. Committees existing under this designation are in effect correlating and advisory in nature and not executive in authority. The Committee deprecated the use of the word "executive" and recommended employment of terms more nearly describing the functions of such committees, such as "correlating" or "advisory."

The Committee gave careful consideration to the question of attendance at Section or Group meetings of persons who are not authorized representatives of companies which are members of the Sections or Groups.

The Committee ruled that each Section or Group is free to fix for itself conditions under which such non-members may attend its meetings and recommend that such attendance require at least the invitation of the chairman.

Attention was given to the proposal of the Standards Committee that letter ballot replies from member companies be returned in each instance to headquarters. It was pointed out that this was the desirable practice and the practice employed in the large majority of cases. Some Sections, however, find that it is advantageous to have the replies sent directly to their secretaries for count and report.

The Managing Director reported that the Casualty and Fire Prevention Committee on June 26 had considered the Standard for Industrial Control and Motors for use in Explosive Atmospheres in the feeling that correlation with existing standards would be forwarded by contact with the Bureau of Mines and Underwriters' Laboratories. The Sections directly concerned, namely, the Motor and Generator Section, Mining and Industrial Locomotive Section and Industrial Control Section, had approved the suggested contact.

At the request of the Casualty and Fire Prevention Committee, the Managing Director had extended an invitation to the Bureau of Mines and Underwriters' Laboratories to confer with NEMA in connection with motors and control used in hazardous locations, as contemplated in class 1, article 32 of the National Electrical Code.

Joint Committee on Refrigeration Appointed

The Executive Committee approved on July 25 the Refrigeration Division's appointment of a committee to meet with a similar committee of the National Association of Ice Industries to cooperate in eliminating undesirable advertising and publicity. The Committee also approved a recommendation that in the interim between meetings, difficulties should be called to the attention of NEMA headquarters so that efforts could be made to settle them. All matters impossible of adjustment in this way should then be referred to the joint committee at its stated meetings. The NEMA members are as follows: Mr. Burritt (Kelvinator Corp.), chairman; Mr. Harlan (Frigidaire Corp.) and Mr. Zimmerman (General Electric Co.). The representatives of the Association of Ice Industries are Mr. Bennett, vice-president, New England Ice Division, National Association of Ice Industries; Mr. Authenreith, Middle West Utilities Co., and Mr. Nickerson, publisher of *Ice and Refrigeration*.

Standardization with Outside Bodies

The Standards Committee has authorized R. W. Owens (Westinghouse Elec. & Mfg. Co.) to vote affirmatively on the proposed nomenclature on different types of ball bearings, which is under consideration in the American Standards Association, Sectional Committee on Ball and Roller Bearings B3, of which Mr. Owens is NEMA's representative.

F. B. Hynes (Crocker-Wheeler Electric & Mfg. Co.) has been appointed to replace A. C. Bunker on the Joint Committee with the Diesel Engine Manufacturers Association.

The Standards Committee authorized the NEMA representatives on Standards Council of the American Standards Association to vote affirmatively on the following Letter Ballots:

Transmission Roller Chains, Sprockets and Cutters, B 29a	LB-204
Symbols for Photometry and illumination, Z 11d	LB-205

Report No. 41 entitled "Standards for Insulator Tests and Ratings—April, 1929" has been approved by the members of the A. S. A. Sectional Committee and was forwarded by NEMA and A. I. E. E. to the A. S. A. for approval as an American Standard.

Uniform Accounting Movement Gets Cooperation

On the mailing lists of the NEMA Director of Uniform Accounting are the names of 112 accountants, representing 83 member companies. While this is a gratifying start toward enlisting the cooperation of the industry in the uniform accounting movement through the accountants themselves, it is desirable to increase the number of contacts with accountants. It is suggested that executives of member companies who have not registered their accountants do so at this time, as the progress of the industry in the development of its accounting practices depends directly on the active support of the accountants.

Standards Committee Approves Motor Ratings

The Standards Committee has approved standards on rating for synchronous motor-generator sets of 200 kw. and above.

These standards give voltage ratings both a-c. and d-c.; frequencies; kilowatt capacities, and speeds for both two- and three-unit sets.

Performance standards are also given for temperature rise, power factor and overload.

The rules will be included in the new standards of the Motor and Generator Section which will soon be published.

NEMA Section and Committee Notes

Mining and Industrial Locomotive Section—S. R. Nicholson has been appointed associate representative of the Vulcan Iron Works.

Wire and Cable Section—The representatives of the General Cable Corporation are now as follows: H. T. Dyett and D. R. G. Palmer, executive representatives, and C. W. Abbot, H. E. Eagleston, E. H. Etheridge, G. M. Haskell, Moss Kent, J. H. Maxson, C. A. Scott and A. D. Williams, associate representatives.

Casualty and Fire Prevention Committee—C. S. Spreen has been appointed to this Committee as representative of the Refrigeration Division, in place of H. C. Hayes, who resigned May 20.

Small Air Circuit Breaker Section—I. T. E. Circuit Breaker Company has joined this Section.

Transformer Section—The Standard Transformer Co. of Warren, Ohio, is now a member of this section. W. F. Parker is executive representative.

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SHIMER Screw Machine Products are exact and uniform throughout—we would like to demonstrate to you the accuracy and speed with which we can complete your order. We make them by the millions, in iron, steel or brass and can assure you accuracy through frequent and exacting inspections.

Send us blueprints or sketches —we will be glad to give you an estimate on your problem whether it calls for "made to order" or standard parts and can assure prompt delivery.

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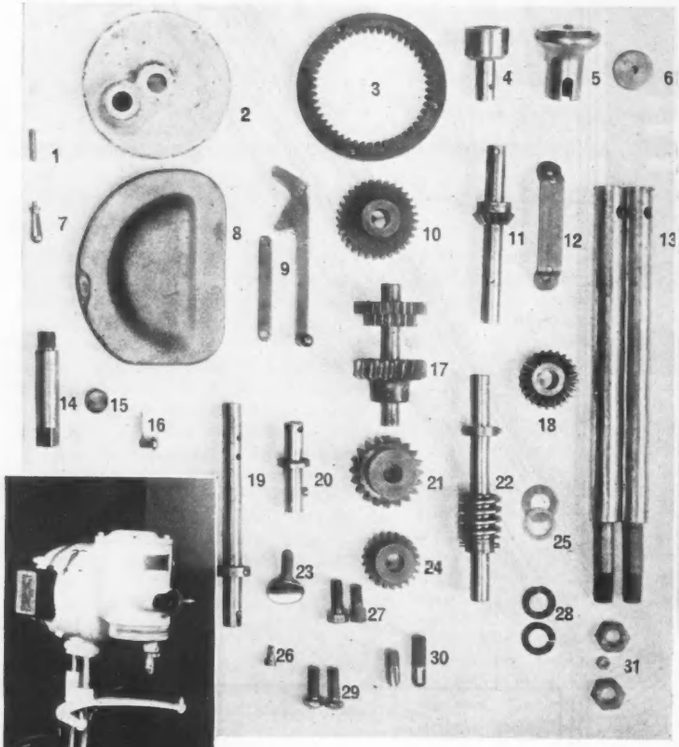
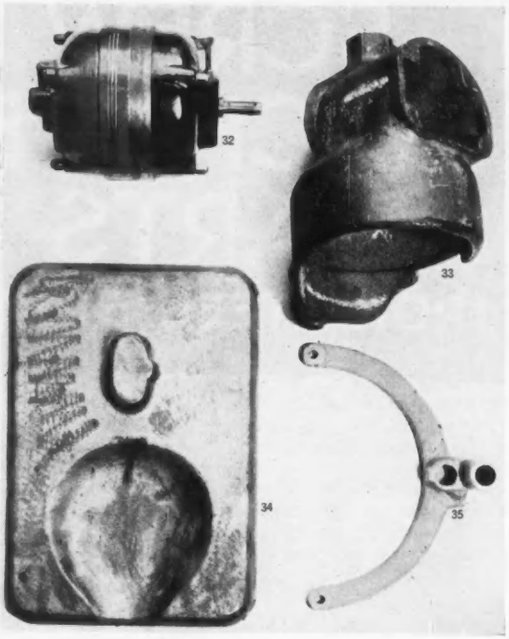
Kitchen Mechanic Components





NOTE: An article describing the method used in selecting the motor for this product appears on pages 41, 42 and 43 of this issue.

EVERY piece of the machine illustrated here is bought from outside of the plant in which the machine is assembled. The machine is produced at the approximate rate of three thousand per year, and parts are bought one hundred at a time. Besides the parts shown here there are numerous accessories bought to be sold with the finished machine. An attempt has been made to show only the parts of the machine itself. Notice also that a small circuit-breaker switch and rubber cord set accompany every machine sold

ELECTRICAL MANUFACTURING *acknowledges the assistance of the Gem Appliance Corporation, New York City, in the preparation of the illustration above and the compilation of the following table of kitchen mechanic components. The illustration is comprised of the various parts of the device, and the table lists the materials from which each part is made*

Table of Parts and Raw Materials Used in a Kitchen Mechanic

No.	Part Name	Material	No.	Part Name	Material
1	Tapered pin	Steel	20	Mixer bearing shaft	Cold rolled steel
2	Mixer head	Cast iron	21	Main worm	Bronze
3	Internal gear	Cold rolled steel	22	Main worm bearing	Cold rolled steel
4	Square bearing pin	Steel	23	Attachment thumb screw	Malleable iron
5	Whipper head	Aluminum	24	Main bearing gear	Cold rolled steel
6	Shift key	Brass	25	Washers	Cold rolled steel
7	Bowl lever handle	Brass	26	Bowl holder pin	Brass
8	Mixer head cover	Cast iron	27, 29	Pins for holding cover	Steel
9	Bowl lever combination	Brass	28	Lock washers, general use	Steel
10	Main gear drive	Steel	30	Lifting bowl supports	Brass
11	Main shaft drive	Steel	31	Nuts for general use	Steel
12	Switch bracket	Steel stamping	32	Main motor, 1/6 hp., 1725 r.p.m. Standard sleeve type wick oil bearings	
13	Column supports	Cold rolled steel			
14	Square bearing	Cold rolled steel			
15	Washer ring	Cold rolled steel hardened	33	Main casting to take motor and gear reduction box	Cast iron
16	Spring clip for beater	Brass and steel			
17	Main bearing shaft combination	Steel, bronze, cast iron	34	Base	Cast iron
18	Attachment gear	Cold rolled steel	35	Bowl holder	Cast iron
19	Attachment shaft	Cold rolled steel			

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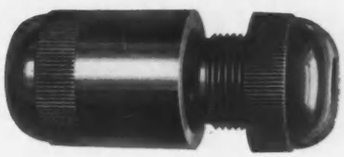

MOST industries make it a part of their carefully planned policy to specify "ARC-Phenolic" for *all* molded parts. Whether your needs be for large or small, highly specialized or utterly simple molded parts, the wealth of a half century of experience coupled with the boundless facilities of the world's largest molding plants will prove an invaluable manufacturing source.

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A mechanical device, revolving with the shaft, it forms a leak-proof ground joint against the gland face, reducing friction and wear and thus saving dollars for maker and user. Already used in scores of different types of machinery, it may be worth its weight in gold when business is hard to get. Write us today for description and prices.

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National Power Show Goes Forward

Preliminary details of the Ninth National Exposition of Power and Mechanical Engineering to be held Dec. 1 to 6, in Grand Central Palace, New York City, are well-nigh completed, according to I. E. Moultrop, chairman. Already one of the problems facing the committee in charge is finding space for the exhibitors planning displays. Business conditions are such at this time, it is said, as to make the show more valuable than ever before. A larger attendance than ever is expected. An advisory committee has been appointed composed of Homer Adams, N. A. Carle, H. D. Edwards, Fred Feldeman, V. M. Frost, L. A. Harding, C. F. Hirshfield, O. P. Hood, J. H. Lawrence, F. R. Low, D. M. Myers, F. W. Payne, Charles Piez, J. W. Roe and Charles F. Roth.

Westinghouse Lamp Sales Plan Announced

Westinghouse Lamp Company, East Pittsburgh, Pa., announces, through A. E. Allen, vice-president, a new Mazda lamp sales plan and discount schedule for agents and purchasers effective Sept. 1, 1930. The three principal features of the new plan are provision for a higher rate of compensation for 19 per cent of the retailers, a greater recognition of the proper function of the wholesaler and a special discount rate.

Campaign for Lighting Gets Under Way

A campaign to foster year-round attention on decorative lighting suitable for all types of holidays and social events gets under way this month. Already the National Decorate-With-Light Committee has made available through the Society for Electrical Development a colorful plan book, complimentary copies of which have been sent to electrical leagues and all member companies of the national association. The plan book presents an electri-calendar which suggests periods when there is apt to be high interest in decorative lighting.

Export Trade Developed by R. M. A.

Special efforts to develop export trade in radio products are planned by the Radio Manufacturers Association through its newly organized Foreign Trade Committee. Arthur Moss, of Electrad, Inc., New York City, is chairman of the new committee.

Showing the Thyraton

DR. IRVING LANGMUIR (left) and Dr. Albert W. Hull, with the new Thyraton tube they perfected in the G. E. laboratories for long distance electrical transmission

Committee Appointments of A. I. E. E.

At the August meeting of the board of directors of the American Institute of Electrical Engineers, President W. S. Lee announced the committee appointments for the year beginning August 1, 1930. In all, thirty-five committee heads were appointed. The more important ones follow:

Executive Committee, W. S. Lee; finance, C. E. Stephens; meetings and papers, A. E. Knowlton; publication, W. S. Gorsuch; board of examiners, H. W. Drake; sections, E. S. Lee; membership, J. A. Johnson; headquarters, R. H. Tapscott; public policy, Bancroft Gherardi; standards, F. D. Newbury; safety codes, A. W. Berresford; communication, G. A. Kositzky; education, W. R. Work; electrical machinery, P. L. Alger; electric welding, P. P. Alexander; Power applications, C. W. Drake; application of light, G. W. Merrill; power generation, F. A. Allner; research, L. W. Chubb, and transportation, Sidney Worthington. At the same meeting, new members were added to other committees.

I. R. E. Hold Convention in Toronto

The fifth annual and first international convention of the Institute of Radio Engineers was held in Toronto, Canada, August 18-21. During the convention the engineering division of the Radio Manufacturers Association held joint technical meetings with the I. R. E. Speeches by prominent figures in the radio world featured the occasion. On Tuesday, Aug. 19, there was a symposium on international communication. Lee de Forest, president of the institute, made the welcoming speech.

Electrical Inspectors Meet at Chicago

The program for the twenty-sixth annual meeting of the Western Section International Association of Electrical Inspectors contains many subjects of unusual interest. In addition to the usual committee reports on various articles of the National Electrical Code, a number of special features has been arranged for the session which will be held at the Congress Hotel, Chicago, September 15, 16 and 17. The uniform electrical ordinance will be discussed by Harry B. Kirkland of The Society for Electrical Development. A. Penn Denton, of NEMA, has chosen for his subject "Does the National Electrical Code Provide Adequate Wiring?" Stanley A. Dennis, editorial director of the Gage Publishing Company, will represent the electrical press and will discuss "The Electrical Inspector and the Business Press." Victor H. Tousley of the National Fire Protection Association will talk about the problems confronting the electrical field engineer. The session will end with a reception and dinner dance. L. A. Barley is president of the Western Section.

Country Set for National Radio Week

National Radio Week, September 22-28, is occupying the center of the stage at this time for the National Federation of Radio Associations and the Radio Wholesalers Association. Member organizations are taking an active part in promoting the success of Radio Week. On the West coast, the Pacific Radio Trade Association is carrying on a huge campaign to make the public "radio conscious" during this period. Some of the active radio trades associations that are promoting National Radio Week in their respective localities are those in St. Louis, Minneapolis, Milwaukee, Rochester and Reading, and the Midwest Radio Trades Association, Chicago.

Williams Ice-O-Matic Convention

The sixth international Williams Ice-O-Matic Convention was held in Bloomington, Ill., August 18-20 with 3235 dealers, salesmen and service men present. The opening speaker was C. U. Williams, president of the Williams Oil-O-Matic Heating Corporation. The two-day session was marked by addresses, sports, entertainment and banquets. Despite somewhat unsettled general business conditions, Ice-O-Matic shipments for the first seven months of 1930 increased 41 per cent over the corresponding period of last year.

Pioneers

The colorful ceremony attending the driving of the "last spike" of the Union Pacific, linking East and West, was but the beginning of an era of empire building. The founders of this great railroad were great industrial pioneers.

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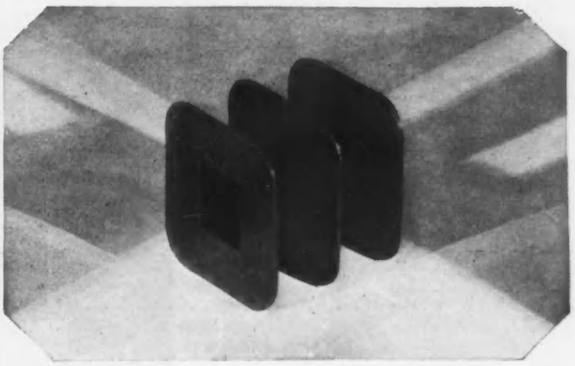

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Not long ago, a famed American Electrical Manufacturer came to Norton Laboratories with a puzzling problem in plastic moulding. The problem, briefly stated, was to mould a part used in one of their electrical products, so accurate that when a fine wire was coiled on one half of the part, the exactly same number of strands could be automatically coiled on the other half.

Here indeed was a problem. The part must be moulded within the accuracy of two-one thousandths of an inch. Norton said it could be done—and set about to do it in production quantity. Today, this great company has placed many repeat orders for this part. They must be wholly satisfied with the result.

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Detroit, Mich.
W. H. Mark Hanna
6-247 General Motors Bldg.

Hillside, N. J.
Mr. A. C. Hall
1262 Miriam Place

R. M. A. Establishes Patent Bureau

A step toward solution of patent troubles in the radio industry has been taken by the Radio Manufacturers Association with the establishment of a central patent bureau to collect and disseminate complete information on radio patents. This bureau was started by the R. M. A. Board of Directors at its mid-summer meeting July 30.

Merchants' Association Prints Book

The Merchants' Association of New York, in a new booklet entitled "New York, America's Style and Buying Center," emphasizes the city's offerings in machinery, machine tools, electrical tools, engineering and building equipment and metal products. Five hundred thousand copies have been printed in an effort to bring more buyers to New York City.

Amplifier Concern Receives Canadian License

Canadian Patents, Ltd., composed of General Electric, Westinghouse and Northern Electric companies, the last named being Western Electric of Canada, has licensed the Radio Receptor Company to build and sell power amplifiers in Canada. The license, which has been under consideration for two years, makes the Radio Receptor Company, the first American power amplifier concern given permission to manufacture and merchandise amplifiers in Canada.

New Bearing Metal Developed

A new bearing metal in the form of a self-lubricating bearing has been invented by W. C. Wilharm of the Westinghouse Research Laboratories, who claims that his invention is ten times as efficient as the "oil-less" bearings in use today. The new bearing is capable of resisting the heating action of friction for a considerable length of time.

Safety is Keynote of Session

The nineteenth annual Safety Congress and Exposition will be held in Pittsburgh during the week of September 29 to October 3. An important part of the convention will be a conference by the metal industries of the United States to consider accident prevention problems. More than 1,700 different metal industries, employing more than 2,800,000 workers, will be represented. They are cooperating with the National Safety Council in accident prevention work.

"Electric Eye" Counts

CARS passing over the Ambassador Bridge, Detroit, are automatically counted by a new application of the photo-electric cell. A beam of light from the ceiling is focused on the cell. Every car that passes breaks the beam and is automatically registered

Electrical Standards Now Available

The new standards of the American Institute of Electrical Engineers covering constant-current transformers of the moving-coil type and air circuit breakers are now available in printed form. It is stated in the preface that the chief purpose has been to define the terms and conditions which characterize the rating and behavior of electrical machinery and apparatus.

Standard Office Building Specifications

The Electric Association of Chicago has issued a book called the "Standard Electrical Specifications for Office Buildings." It is the result of a year's labor and is as complete a text as can be prepared under existing conditions. The book presents in concrete form the electrical requirements of modern office buildings. It is presented as a reference guide and as the recommendations of the industry for proper electrical installation, according to G. W. Lloyd, president of the association.

Safety Code for Electric Refrigeration

The safety code for mechanical electrical refrigeration prepared under the auspices of the American Society of Refrigerating Engineers has been submitted to the American Standards Association for approval. The code, which has been in preparation for the last two years, has been issued in pamphlet form and may be obtained from the society's headquarters at 37 West 39th St., New York City.

Westinghouse Creates New Sales Section

Creation of a new section to be known as the Sales Service Section is announced by M. C. Morrow, domestic appliance sales manager of the Westinghouse Electric & Manufacturing Company, Mansfield, Ohio. W. W. McFadden, who for many years supervised similar activities in the range section, is manager of the new section.

Lighting Book Put Out by Curtis

A new, handsomely bound, 320-page volume called "The Lighting Book" has been issued by Curtis Lighting, Inc., Chicago. The volume describes the history of illumination from its earliest sources right through to modern lighting. Thomas A. Edison was presented with a copy of the book, and after looking through it expressed pleasure at its beauty.

Miss Zillessen Appointed Committee Head

Announcement is made by Harry Reid, chairman of the Public Relations National Section of the N. E. L. A., of the appointment of Miss Clara Zillessen, Philadelphia Electric Company, Philadelphia, as chairman of the National Women's Committee for the year 1930-31.

Crowded Hall

A PORTION of the 3300 Williams Ice-O-Matic employees who attended the company's sixth international convention in Bloomington, Ill., Aug. 18 to 22. This is said to be the largest crowd ever to attend a session of a single organization

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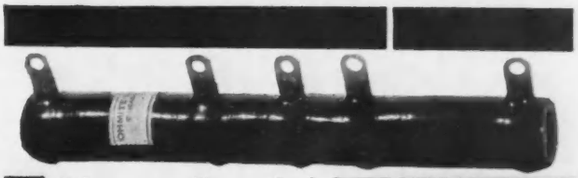
INSULATING MATERIALS

for Rubber Covered and Weatherproof Wire, Coils, Condensers, Conduit, Wet and Dry Batteries, Wiring Devices, Sockets, Switchboards, etc. MATERIALS TO YOUR OWN SPECIFICATIONS OUR SPECIALTY. Compounds for Radio Parts.

35 Years' Experience in Compounding

CANDY & COMPANY, Inc.

35th and Maplewood Ave., Chicago, Ill.



Vitreous Enameled
RESISTORS

Ohmite's claim for superiority can be fully sustained by operating tests in your own laboratory or X-ray examination.

Even spacing, undisturbed by our exclusive enameling processes, insures freedom from hot spots.

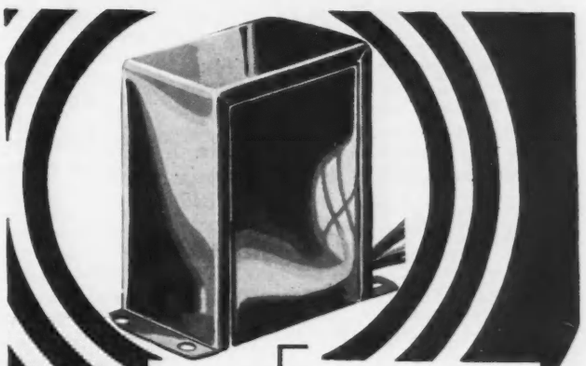
Electrically sound terminal connections assure the unvarying output that good performance demands.

You can depend on Ohmites in your product.

Have you our Engineers' Reference Book?

Ohmite Mfg. Co.
629 N. Albany Ave.
Chicago, Ill.

OHMITE



Electrical
CONDENSERS

The more experience you have with Fast Condensers the more respect you will have for them. They embody the utmost in design, materials and perfection of manufacturing processes. When Fasts' cost no more, why be content with a *second-best*? Samples to your specifications on request.

FAST

Specialists in Radio Condensers

JOHN E. FAST & CO.

3123 N. Crawford Ave., Chicago, Ill.

Beardsley & Wolcott Makes Reid Vice-Pres.

R. W. Reid, formerly assistant general manager of the Taft-Pierce Company, Woonsocket, R. I., was appointed vice-president and general manager of the Beardsley & Wolcott Mfg. Company, Waterbury, Conn., manufacturers of Torrid electrical appliances, at a recent directors' meeting. Mr. Reid succeeds C. E. Beardsley, former president and general manager, who resigned. Rawley W. Phillips, secretary of McKesson-Robbins Company, was re-elected secretary. Francis W. Phillips was made treasurer, Emil Mannweiler, of the Eastern Malleable Iron Company, was elected to the board of directors for the coming year.

Augustus D. Curtis Award Established

An annual Augustus D. Curtis Award has been established to give recognition to the individual or individuals in any member power company of the N.E.L.A. who contributes most to the advancement of the electric lighting of interiors or exteriors of public and commercial buildings.

N. E. L. A. Puts Out New Book

"Miscellaneous Electrical Household Devices," ninth booklet of the series "More Power to the Home," has been published by the Women's Committee of the National Electric Light Association. Some of the others are "Wiring the House," "Better Lighting" and "Electric Range Cookery."

Appleton Buys Floodlight Projector Line

The Appleton Electric Company, 1701 Wellington Ave., Chicago, manufacturer of Appleton Threaded and No-thread malleable unilets and conduit fittings, announces the purchase from the National Appliance Company, Jackson, Mich., of the complete line of National floodlight projectors.

Brevities

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces the appointment of T. R. Langan as assistant northeastern district manager. Mr. Langan has been with Westinghouse for more than twenty years.

Consolidated Lamp & Glass Company, Coraopolis, Pa., announces the appointment as vice president and sales manager of Franklin W. Loomis, development and lighting engineer.

Polymet Manufacturing Corporation, New York City, announces the appointment of James Pope, Jr., as its representative for Minnesota, North and South Dakota.

Coils, Inc., Providence, R. I., has taken over the equipment of the Coto-Coil division of the Universal Winding Company, Providence.

Olson & Ensinger, Inc., 228 Third St., Milwaukee, Wis., has changed its firm name to Dyer-Ensinger Company.

Rex Manufacturing Company, maker of electric refrigeration cabinets, Connersville, Ind., has undergone a reorganization, according to C. C. Hull, president. The firm is coming out of a frozen asset condition in good shape.

R. C. A. Radiotron Company, Harrison, N. J., announces that L. W. Teegarden, prominent in the electrical industry, has been appointed district sales manager in the Lake Erie sales division. Headquarters will be in the Union Trust Building, Cleveland, Ohio.

Robbins & Myers Sales, Inc., Springfield, Ohio, call attention to the fact that Thomas W. Quilter has been appointed manager of the company's Atlanta office, succeeding C. V. Malone, who recently resigned. It is also announced that W. S. Motter has been appointed manager of the Philadelphia office, succeeding R. F. Decker.

Kelvinator Corporation, Detroit, Mich., reports for the nine months ended June 30, 1930, a net profit of $2,112,964, which compares with the $1,301,657 of the nine months ended June 30, 1929.

Electrad, Inc., New York City, has appointed Xavier de Nice as export manager in its enlarged export department.

Federal Steel Products Company, manufacturer of electric safety switches, Newark, N. J., has opened a new office and warehouse at 25 West Broadway, New York City.

Transformer Corporation, New York City, manufacturer of Clarion Receivers, announces Clarion Junior, a new midget receiver to retail for $47.50.

Jewell Electrical Instrument Company, Chicago, Ill., announces the appointment of the B. F. Keith Company, Atlanta, Ga., to represent them in the Southeastern states.

Master Electric Company, Dayton, Ohio, has issued a booklet describing the Master offices and setting forth its facilities for serving the electrical industry.

Lamb Engineering & Equipment Company, 1666 West Ogden Ave., Chicago, has moved to 230 North Canal St., Chicago.

Morgan Electric Manufacturing Company, Worcester, Mass., has its new plant at 57 Jackson St., Worcester.

Driver-Harris Company, Harrison, N. J., has been granted a melting license by the Krupp-Nirosta Company, Watervliet, N. Y., for the production of Nirosta steel in the form of castings, rods, sheet, strip and wire.

Sprague Specialties Company, Quincy, Mass., has moved sales and general offices to North Adams, Mass.

Worthington Pump and Machinery Corporation, Harrison, N. J., announces a gain in assets for the first half of 1930 as compared with the same period last year.

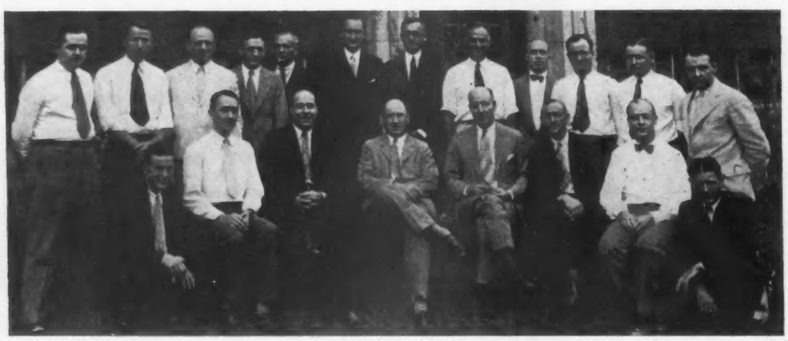
Republic Steel Corporation, Brooklyn, N. Y., has won control of a new process connected with the electric welding of steel pipe in a verdict handed down by the United States district court in Brooklyn. At the same time the court reaffirmed the validity of the Johnston process for continuous electric welding owned by the company.

Davis Slate & Manufacturing Company, Chicago, announces the sale of its Muskegon branch to R. F. Muriset and associates, who will operate under the name of the Michigan Cut Stone & Slate Company.

Barrett-Cravens Company, 1328 W. Monroe St., Chicago, has moved into its new plant at 101 West 87th St., Chicago. This places Barrett-Cravens under the same roof with its two affiliated companies, the Walker Vehicle Company and the Automatic Transportation Company.

The J. J. Madden Company, Cleveland, Ohio, has taken the sales franchise for the products of the New Era Electric Manufacturing Company, Cleveland, Ohio, for Michigan and Ohio.

Chromalox Sales and Engineering Representatives Meet



THIS is the crew that is covering the country for the Edwin L. Wiegand Company, gathered at the annual sales meeting in Pittsburgh, Aug. 6 to 8

PROPERLY MOULDED BAKELITE PARTS

insure absolute accuracy and exact uniformity in your product. They save time in assembling, eliminate expensive machining operations and lower your manufacturing costs. They require neither buffing nor polishing, yet have a fine and lasting finish—in colors if desired. Their tensile and dielectric strength is high—they are unaffected by moisture, oils and most acids. Ours is the largest plant in the Middle West devoted exclusively to the manufacture of moulds and custom moulding of Bakelite parts.

Write for our catalog.

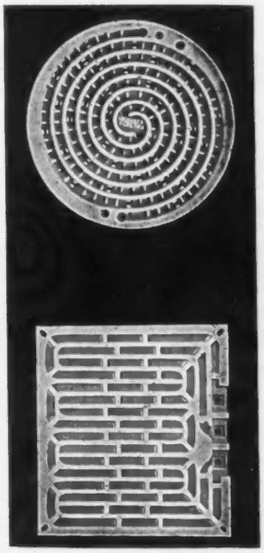
Chicago Moulded Products Corp.

2144 Walnut Street :: Chicago, Illinois

Subsidiary to Plymouth M'f'g Co.

6 reasons why you can depend on Electrical Refractories

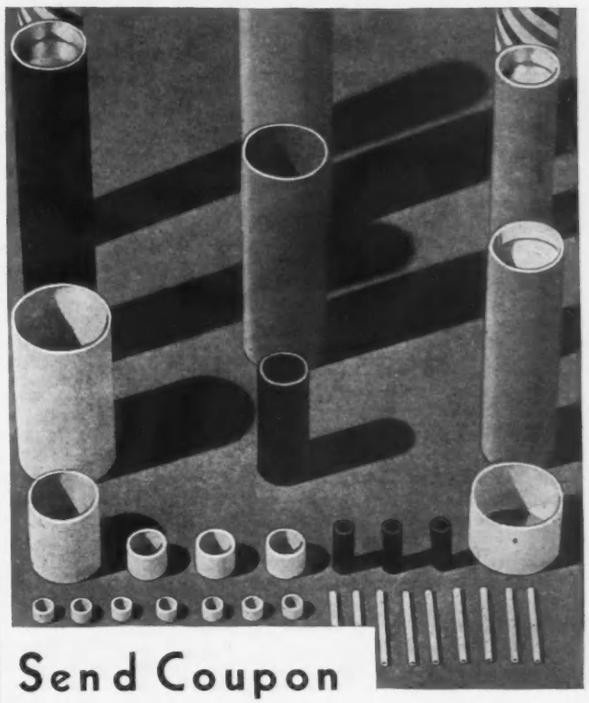
1—A careful selection of the formulas to especially meet your requirement.
2—Thereby insuring maximum of strength at highest temperature.



3—And definite insulation for the resistors at operating heat.
4—Cleanly moulded and true to specifications.
5—A thorough knowledge of the refractory requirements of electrical heating devices gained by having grown up with this branch of the electrical industry.
6—An organization with factory and equipment which makes possible a class of service heretofore unknown in the clay working industry.

ELECTRICAL REFRACTORIES CO.
50 CLARK STREET
EAST PALESTINE, OHIO
CHICAGO—*G. D. Wilson*, 645 Washington Blvd.
DETROIT—*R. J. Scothorn*, 145 Eastlawn Ave.
ST. LOUIS—*R. V. Hughes* 1701 Washington Ave.
SAN FRANCISCO—*E. A. Wilcox Co.*, 273 7th St.
CLEVELAND—*Insulation Materials Co.*, 3221 *Carnegie Ave.*

STONE'S PAPER TUBES



Send Coupon for Samples of These Money Savers

Stone's Paper Tubes save money in electrical manufacturing because they save time, trouble and labor. Use them to protect armature shafts, threaded shaft ends, etc., when painting or varnishing adjoining parts. Use them for *insulation shields* to prevent contact between the wiring and shafts of armatures; for *insulation sleeves* to slip over spliced wires; for *coil form* supports; and many other practical purposes.

We make an infinite variety of sizes (up to one-inch diameter), colors and coatings in open and closed end tubes with various degrees of wall thickness. Large production, specially designed machines, and forty years' experience enable us to serve you promptly and economically. Send coupon for free samples and practical suggestions.

MAIL THIS FOR FREE SAMPLES

STONE PAPER TUBE CO.
Washington, D. C.

Please send us free samples of Stone's Paper Tubes and list of helpful uses.

Name of company .....

Address .....

City ..... *State* .....

Branch Offices and Agencies

Reliance Electric and Engineering Company, Cleveland, Ohio, announces that James S. Fenton has been promoted to the position of sales engineer of the New York office.

Despatch Oven Company, Minneapolis, Minn., has reorganized its Chicago office and made W. S. Appleton district sales representative.

F. A. Maruna, 3141 West 41st St., Cleveland, Ohio, who for the past ten years has been connected with the A. R. McNally Company, Cleveland, has decided to go into business for himself. He would like to get in touch with reliable manufacturers who desire agents in the State of Ohio. He has sold such items as mica, bakelite and armored cable.

Lionel Corporation, New York City, manufacturers of toy electric trains, announces the opening of a Chicago branch office located in the Merchandise Mart.

Chicago Pump Company, Chicago, announces the addition of H. G. Ragan as representative with offices in Omaha, Neb.

Reliance Electric & Engineering Company, Cleveland, Ohio, announces the removal of its Boston office from 80 Federal St., to 89 Broad St. R. H. Smith is in charge.

Bryant Electric Company, Bridgeport, Conn., announces the removal of its New York office to 60 East 42nd St.

C. D. Wood Electric Company, New York City, has opened branch offices in Chicago, Seattle and Los Angeles, at 562 W. Van Buren St., 2203 First Ave. So., and 741 Kohler St., respectively.

Coming Conventions

National Electrical Manufacturers Association—Annual meeting at Old Point Comfort, Va., Oct. 20-24.

Illuminating Engineering Society—Twenty-fourth annual convention at Hotel John Marshall, Richmond, Va., Oct. 7-10.

American Electrochemical Society—Convention Hotel Statler, Detroit, Sept. 25-27.

American Institute of Electrical Engineers — Pacific Coast Meeting, Portland, Ore., Sept. 2-5; District meeting, Philadelphia, Nov. 13-15.

National Electrical Credit Association—Annual meeting, Philadelphia Chapter, Nov. 14.

International Association of Electrical Inspectors — Western Section meeting, Chicago, Sept. 15, 16, 17. Eastern Association of Electrical Inspectors annual meeting, Pittsfield, Mass., Sept. 22-24.

National Association of Fan Manufacturers—Fall meeting, Detroit, Mich., Oct. 17.

National Electrical Wholesalers Association — Fall meeting, Hotel William Penn, Pittsburgh, Pa., Nov. 10-14.

National Electric Light Association—Meeting Great Lakes Division, French Lick Springs, Ind., Sept. 25-27. Meeting New England Geographic Division, Swampscott, Mass., Sept. 29-30. Meeting Rocky Mountain Division, Albuquerque, New Mexico, Oct. 20-22.

Ironing Machine Manufacturers Association—Fall meeting, Cleveland, Ohio, Oct. 3.

National Power Show—Ninth National Exposition of Power and Mechanical Engineering, New York City, Dec. 2-7.

Manufacturers' Literature

ELECTRICAL MANUFACTURING *presents a digest of recently issued catalogs, bulletins and other advertising material. Manufacturers are invited to send literature for review in this column.*

General Electric Company, Schenectady, N. Y.: Bulletin 1151-A describing mercury arc rectifiers for railway service. Pamphlet GEB-82, oil circuit breakers. Leaflet GEA-1257, mechanical-drive turbines. GEA-1185, electric laboratory apparatus. GEA-1201, herringbone gears. GEA-1052A, synchronous motors. GEA-982B, airport illumination. Leaflets describing the thermostat, photo-electric relay, operators, portable farm motors, switchboard recording instruments, automatic full-voltage controllers, synchronous motors, reduced voltage starters, air-drawing ovens, automatic switching equipment and arc-welding equipment. Bulletin showing G.E. dynamometers and pamphlets describing G.E. floodlighting. Catalog GEA-1248, A-C equipment network. And Bulletin GEC-89 "Electric Helpers for the Farm."

Line Material Company, So. Milwaukee, Wis.: Bulletin describing primary disconnects, duct bells and fuse links, etc.

Preferred Utilities Manufacturing Corporation, New York City: 72-page catalog on preferred utilities for oil burning systems.

Crane Company, Chicago: Circular 225, electric motor operated valves.

Herman H. Sticht & Company, New York City: Bulletin 195, the "Paragon Megohmer."

Beardslee Chandelier Manufacturing Company, Chicago, Ill.: Bulletin No. 1 showing several designs of Gothic style lanterns, brackets and ceiling lights.

Cadillac Products Company, Union City, N. J.: Catalog, 48 pages describing the company's metallurgical products.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.: Arc-welding data bulletins 12 and 13.

Howard & Morse, Brooklyn, N. Y.: Catalog 180, the Blackman and duplex cone fans.

Schaefer Brothers Company, Chicago: Bulletin 107, describing motor starters, speed regulators, rheostats, etc., of direct current type.

Crouse-Hinds Company, Syracuse, N. Y.: Bulletin 2215, showing Arktite extension cable connectors.

Multivane Autodraft & Electric Corporation, Lancaster, Pa.: Leaflet showing the Multivane Autodraft system of automatic house heating.

Reliance Electric and Engineering Company, Cleveland, Ohio: Catalog describing Reliance fully inclosed fan-cooled motors with ball bearings for two and three-phase A-C circuits.

Lee P. Hynes Electrical Heating Engineer, 240 Cherry St., Philadelphia: Bulletin 3-A, showing Hynes electric heating systems and automatic control.

Sangamo Electric Company, Springfield, Ill.: Bulletin 79 describing Sangamo motors, type HC.

F. L. Raymond Company, Chicago: Catalog describing the Raymond duostat for regulating steam heating plants.

Edwin F. Guth Company, St. Louis, Mo.: Catalog No. 2, showing and illustrating the line of Guth fans and Guth illumination fixtures.

Mitchell-Rand Mfg. Company, 18 Vesey St., New York City: Bulletin giving data on insulating compounds prepared by the Mitchell-Rand Company.

Ansonia Electrical Company, Ansonia, Conn.: 48-page bulletin describing electric house goods, including annunciators, buzzers, etc., also catalog showing Shield Brand insulated wires and cables.

Leeds & Northrup Company, Philadelphia, Pa.: Catalog No. 80, "Resistance Thermometers," and catalog No. 90 "The Hump Method for Heat Treatment of Steel."

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.: 36-page catalog of electric appliances, No. 285, with illustration and prices.

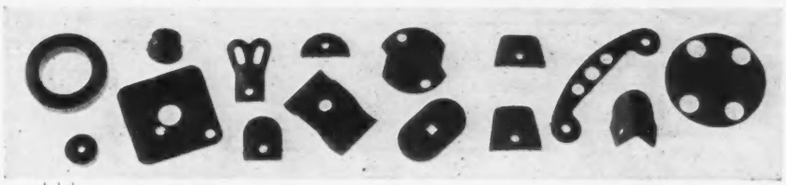
Edison General Electric Appliance Company, Chicago: Catalog J430 illustrating and describing Simplex electric appliances.

Information Wanted

We have been asked for the names and addresses of manufacturers of the articles listed herewith.

Replies from our readers to any of these inquiries will be greatly appreciated by the Information Bureau of Electrical Manufacturing, 461 Eighth Avenue, New York City.

"L R Co" Receptacles.
"Aspinall" Soldering Fluid.
"Burrows" Therapeutic Lamp.
"Williams" Commutator Dressing.
"Flint" Waffle Iron.
"Defiance" Cigarette Lighter.
"Pioneer" House Pumps.
"Indulet" Fittings.
"Thermodyne" Therapeutic Lamp.
"Autochauffe" Heater for Bakery Ovens.
"Wilson" Box Supports.
"Raylite" Automobile Lamp Bulbs.
"Merit" Attachment Plugs.
"Acme" Vacuum Cleaner.



Fibre . . cut as you want it

We fabricate Wilmington Fibre in any shape or form to fit the most exacting requirements of electrical manufacturers. No job is too small and none too difficult.

With a production capacity of 3,000,000 pieces daily you may be sure that we will get the job through ON TIME.

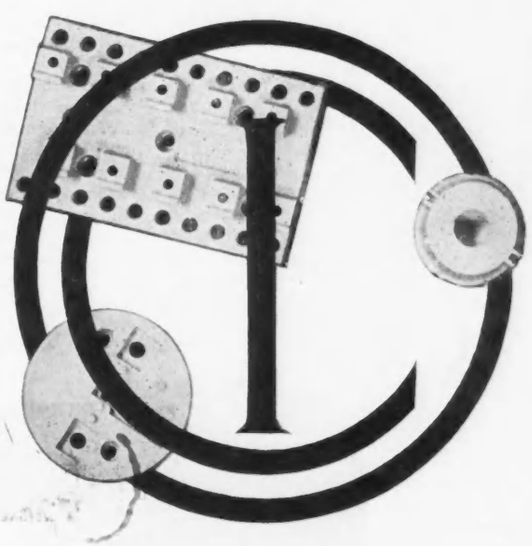
For your own production we can supply you with any quantity of fibre rod, tube or sheets.

Consult us on your fibre problems.

Get a sample of
OHMOID

An approved laminated electrical insulation, having tremendous dielectric and crushing strength. Shock proof, non-deteriorating, and impervious to age, oil, grease and ordinary solvents. Test it yourself.

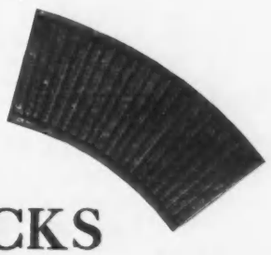
WILMINGTON FIBRE SPECIALTY CO.
Wilmington, Del.
World's Largest Manufacturers of Fibre Specialties



Colonial-*Quality*

Special Electrical Porcelain and Refractory Porcelain

COLONIAL INSULATOR CO.
Established 1894
Akron, Ohio



BLOCKS
made of
LAVA
the Superior Insulation

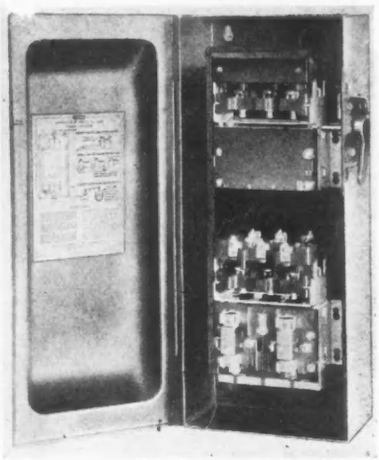
Appliances insulated with Lava denote careful thought on the part of the manufacturer.

AMERICAN LAVA CORP.
1423 Williams St.
Chattanooga, Tennessee
Manufacturers of Heat Resistant Insulators

New Goods for Your Inspection

Manual Motor Starter

Condit Electrical Mfg. Corp., 842 Summer St., Boston, Mass., offers its Type A-15 manually-operated air motor starter



which the manufacturer states will break circuits carrying heavy loads with negligible sparking. Contacts are assembled in units on insulated carrier bases, one stationary and the other movable. The movable contact base can be withdrawn without the use of tools, permitting easy inspection of both movable and stationary contacts. Stationary and movable contacts are identical and interchangeable. The starter is inclosed in a steel case arranged with conduit knockouts. Thermal cutouts are provided for time-lag overload protection. Type A-15 starter is furnished for 7½ hp. at 550 and 440 volts, 5 hp. at 220 volts and 3 hp. at 110 volts.

Precision Resistors

International Resistance Co., 2006 Chestnut St., Philadelphia, Pa., offers a line of precision wire wound resistors for laboratory purposes, for resistance coupled amplifier plate resistors, high-voltage regulators, multipliers for converting microammeters and milliammeters into high-reading voltmeters, and for experimental work in connection with vacuum tube circuits. At the maximum rated load of one watt, the change of resistance of these resistors is approximately three-quarters of one per cent. The maximum change of

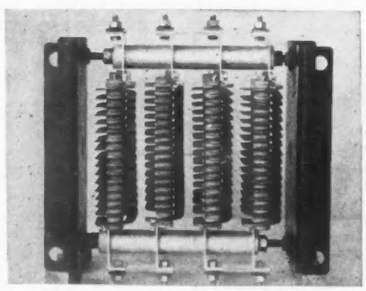
impedance with frequency up to 50,000 cycles is less than six per cent. The temperature coefficient of resistance is 0.002 per deg. C. Nickel chromium alloy wire is used. The wire is wound in the form of "pies," the overall resistance of the completed unit depending upon the number of "pies." Resistance values up to 500,000 ohms are available in this type of resistor. The terminal of these resistors consists of a cylindrical body and a conical end to take either of the two general types of clips and also has a No. 4 machine screw molded directly to the end. Knurled nuts are provided for making temporary connections.

Field Coil for Dynamic Speakers

Inca Mfg. Corp., Fort Wayne, Ind., announces a choke coil for use in the field of dynamic radio speakers which can be furnished with or without external leads. Terminals are instantly available, but long external leads are not necessary. This coil is essentially a coil of enamel wire without a spool sealed in an insulating sheath. The coil is bound by two circumferential bands provided for the purpose of giving strength to the coil.

Edgewise-wound Heavy-duty Resistor

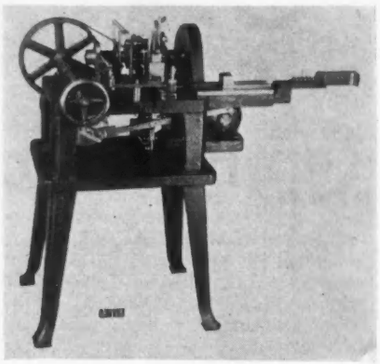
General Elec. Co., Schenectady, N. Y., offers an edgewise-wound, heavy-duty resistor, designated CR-9132, featuring rigid terminals that make connection easy. This resistor is of the unit-box type. These resistors are mounted on a support consisting of two steel punchings held firmly



together but insulated from each other by a heat-resisting molded insulation. Cleats of fired alumina insulate the resistive conductor from the support. These cleats are locked in place after the unit is assembled by bending the projection on the support to prevent their movement. A copper connector, silver-brazed to each end of the resistive conductor, permits bolting the extreme end of the resistive material to the support. The ends of these supports, together with clamps, provide rigid terminal connections for interconnections and for user's leads. Good contact between the connector and support is assured by tin-dipping the connector after brazing. These units are offered in the form of a complete line of 20 sizes, covering a current range of from 22 to 136 amp., with a corresponding resistance range of from 2.5 to .058 ohms. Four combinations are standard, as follows: (1) without taps; (2) with a center tap; (3) with two taps at ⅓ spacing, and (4) with three taps at ¼ spacing.

Wire Forming Machine

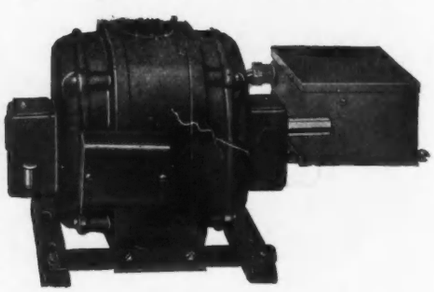
E. R. Seifert, Syracuse, N. Y., has announced a wire forming machine which can be adapted to many conditions of



manufacture. It is mounted on a cast iron frame, and is equipped with a built-in motor, feed, cut-off tool, camshaft, and wire-straightening device. The machine is available completely equipped or without the forming tools. The machine is designed particularly for forming hard wire such as used in heater units, and can be equipped with any number of working slides and punches, from one to twenty-four, for making zig-zag bends. It can also be equipped for forming loops of one or more turns in connection with other shapes.

Capacitor Motor

Baldor Elec. Co., 4352 Duncan Ave., St. Louis, Mo., announces its Capacitor type quiet single-phase high-torque motor, constant speed, ⅛ to ⅓ hp., 60 cycle, 1750 and 1140 r.p.m. This motor has been designed especially for use in domestic appliances where it is essential to reduce noise to the minimum. The stator winding has two phases, one of which is connected to the line and the other to the static condenser. This constitutes the running connections. For starting, an extra condenser is interconnected to both the main and auxiliary winding in such a manner as to give the maximum starting torque. When the motor is approximately up to speed a centrifugal switch disconnects the con-



denser used in starting. The rotor is of squirrel-cage type with heavy shaft and bearings. The rotor, including the switch is balanced dynamically and run without vibration. Condensers are contained in a sheet metal box. A resilient spring base is provided for absorbing vibration. Sleeve bearings are used.

No shocks
No jars
No strains

ONEIDA
FLEXIBLE
COUPLING

This coupling has become a vital part of many motor-operated machines such as that illustrated. Many of the best known electrical clothes washers, too, are ONEIDA equipped.

The ONEIDA absorbs the torsional strains of sudden stops and starts—it will never wear out and is made in various sizes to meet practically all existing needs.

Specify the size you'll probably use and we'll send a sample.

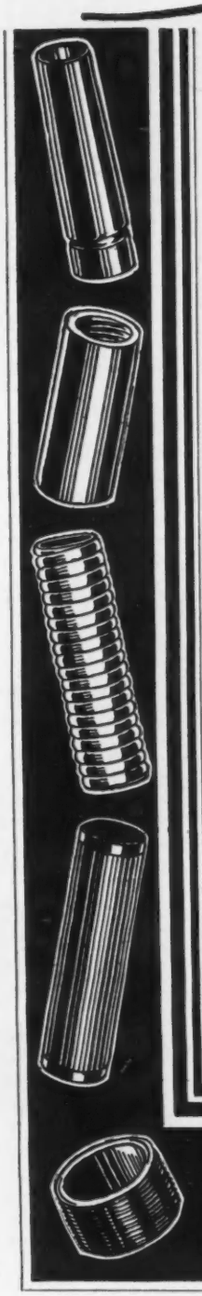
DELBEE RUBBER CO., *Syracuse, N. Y.*

INSULATING
PAPERS
FOR THE
ELECTRICAL
INDUSTRY

Red Rope Paper
Armature Paper
Imitation Pressboard
Cable Paper
Glassine

Made by
RIECEL PAPER CORPORATION
342 Madison Ave. New York
MILLS IN NEW JERSEY
AT RIEGELSVILLE AND MILFORD

Fibre BRANDYWINE



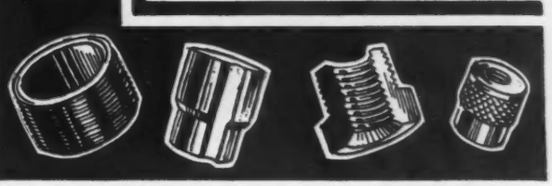
Fibre parts of precision ... made from our fibre tubing as a base

BRANDYWINE can furnish you cut to length pieces, turned or machined to order shapes—counterbored, drilled, threaded or otherwise produced to order. Handles, liners, spacers, ferrules, sleeves, grommets, bushings—either plug or screw shank and in fact Fibre Tubing pieces of all kinds. Send us your blueprint.

..and fibre tubing in any length

If you prefer to do your own fabricating BRANDYWINE can furnish you Fibre Tubing in standard mill lengths, cut to length pieces, etc.

LET US HEAR FROM YOU. THERE IS A REASON.



Brandywine Fibre Products Co.
1402 Walnut Street
Wilmington, Del.

Small Motor Starting Switch

Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. Bulletin 9103 two-pole, push-button operated starting switch

with thermal overload relays, for small D. C. and polyphase A. C. motors. This switch can be used with motors up to ½ hp., 115 volts, and ¼ hp., 230 volts, or with A. C. motors single, two or three-phase up to two hp., 110 to 550 volts. Small in size, the enclosing case is a standard wiring box; the switch can be mounted right on the machine, at the operator's finger tips. Double-break silver contacts and a quickbreak contact mechanism assure long life and continuous current carrying capacity. The thermal overload relays allow working the motor to the limit, yet disconnect it as soon as an overload becomes dangerous to the motor. When tripped by an overload, simply pushing the "reset" button resets the relay and starts the motor.

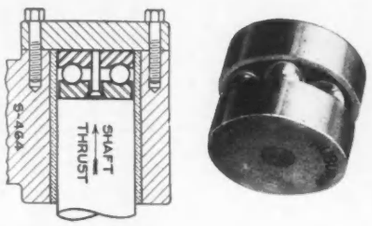
Voltohmmeter

Jewell Electrical Instrument Co., 1650 Walnut St., Chicago, announces its Pattern 574 Voltohmmeter designed especially

for radio test purposes. The meter is mounted on a panel which carries jacks and switches. A 4½-volt battery is mounted back of the panel for use in resistance and continuity checking. Test leads supplied with the instrument are held in place when not in use by an elastic band. The meter has two scales, one reading 0-100,000 ohms, the other reading 0-300 volts. By pressing a button marked "Low Resistance" the resistance range can be decreased to 1/10 its value. Likewise, the voltage scale can be decreased to 0-30 volts or increased to 0-600 volts by operating various buttons. Push buttons are of the locking type.

End Thrust Ball-Bearing

Auburn Ball Bearing Co., 57 Clarissa St., Rochester, N. Y., offers its T-114-RG ball thrust bearing which fits into a recess



at the end of the shaft the same diameter as the shaft, requiring a minimum of machine work. Owing to the small pitch diameter of the ball groove for a given shaft diameter, and due to the large size balls used, the peripheral speed of the balls is relatively low. The two races and balls are held together as a unit by a rod in the center which is flanged on the ends, permitting free rotation of the races, yet holding them together. The races are heavy in section and the grooves deep for severe service. The bearings are available in sizes from 1 3/16 to 3 15/16-in. dia.

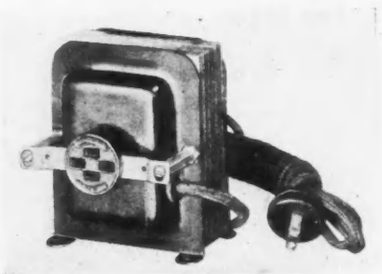
Esco Dynamotors and Motor Generators

Electric Specialty Co., Stamford, Conn., announces a line of Esco dynamotors and motor generators, for operating alternating current radio receivers or other apparatus from direct current. They are equipped with standard attachment plugs

providing "plug in" connection between A.C. apparatus and D.C. A new type filter is provided which, in addition to silencing the noises of the machines, smooths out stray noises brought in by the D.C. lines. This gives quieter operation than from the A.C. lines. Units are equipped with wool pack bearings. Semi-enclosing prevents damage from objects getting into the machine, yet permits ventilation, assuring cool operation. All units are dynamically balanced. All wiring is totally enclosed. Machines are made in both high and low speeds.

Step-Down Transformer

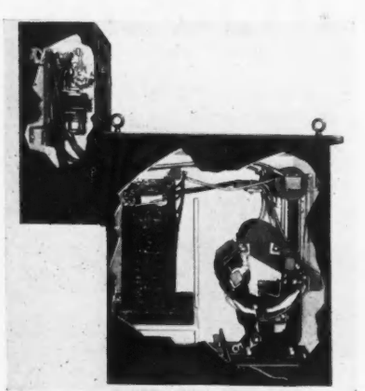
Acme Electric & Mfg. Co., 1444 Hamilton Ave., Cleveland, Ohio, offers a step-down transformer designed especially for



radio use. Primary 220-240 volts, secondary 110-120 volts. The capacity is 150 watts and core loss 6 watts. Temperature rise is less than 20 degrees C. This device has an overload capacity of 50 watts. It is furnished with 8 ft. of cord.

Magnetic Starter

Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio, announces a 2300 volt, full voltage magnetic starter, which, complete with overload relays and a self-contained potential transformer (to secure 220 volts for the control circuit) is intended for across-the-line starting of squirrel cage and synchronous motors. This starter may also be used to control the primary of slipring motors. The starter is built for reversing, non-reversing and plugging applications. All working parts of this starter are oil-immersed. The magnet armature, carrying the movable contact arm, is direct acting and is supported by only one large bearing pin. Contacts open and close the circuit with a wiping and rolling action. They are duplicate and easily renewable. The enclosing case



is a welded steel tank, which houses the completely wired unit. A longer tank containing two magnetic contactors, mounted back to back and mechanically interlocked, is supplied for reversing, non-reversing and plugging applications. This unit construction is said to provide flame-proof, corrosion-proof and dust-proof installation that may be mounted anywhere with safety. These starters are available in 600 hp. and 1200 hp. sizes.

Jos. Stokes RUBBER CO.
TRENTON, N. J.

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Successors to Herald Electric Co.
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L. I. City, N. Y.
Phone STIllwell 4659

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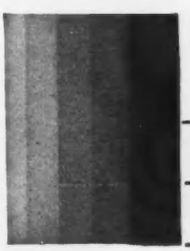

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Upon the confidence of the buyer rests the reputation of Zapon steadily growing through nearly a half century to undisputed leadership.

THE ZAPON COMPANY
STAMFORD, CONN.

ZAPON

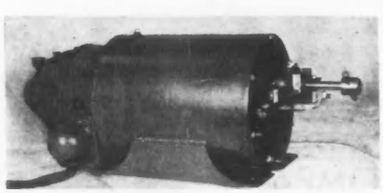
Three Position Pilot Switch

Cutler-Hammer, Inc., 12th and St. Paul Ave., Milwaukee, Wis., announces a three position pilot switch for use on motor driven pumps, compressors and similar ma-

chines which are controlled by an automatic pilot device such as a float switch, pressure switch, time clock, etc. The operating lever of this switch can be placed in either the automatic, off, or manual position. When turned to automatic, the automatic pilot device is in circuit and normal, automatic operation is obtained. With the lever in the off position, the pilot circuit is opened and the motor cannot be started from any other control point. Turning the lever to manual position closes the control circuit direct and the motor will run continuously regardless of any other control devices as long as there is operating voltage on the line. Construction consists of a two button push button switch inside the case, the buttons of which are operated by a cam attached to the operating lever. The lever will remain in any one of the three positions.

Carriage Driving Unit

Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa., announces a combined motor and three-speed reduction unit to drive work handling devices for automatic welding. The requirements of the service are high gear reductions with very wide speed ranges and compactness. This driving unit also proves for engagement and disengagement of the drive while the motor is running. The great ratios in the three gears are 534:1, 1295:1 and 3060:1. With field



control on the motor an uninterrupted speed selection between .393 rpm. to 6.67 rpm. is obtainable. All gears are spur type and all bearings antifriction. The gear shafts and bearings are mounted in gear frames which can be removed from the housing as two separate units for ease of inspection and replacement. The unit has been applied to the 1/3 hp., 1140 rpm., 60 volt, D.C. motor parts in the 7-A SK frame. Mechanical parts are housed in a cylindrical frame bolted to the motor frame as shown in the accompanying illustration.

Portable Power Amplifier

Amplion Corp. of America, 133 W. 21st St., New York, offers its Amplion type PA50-P power amplifier, made under the Loftin-White patents. Improvements incorporated in this device are said to make it possible to modulate two 50-watt power tubes with one 224 screen grid tube. The 244 tube operates directly from a standard phonograph pick-up. The Amplion amplifier utilizes two stages, a 224 tube is used in the first stage and two 545 tubes (50 watts each) are used in the output stage. Two half-wave 566 rectifiers are required. This device is light and compact and is said to be applicable for use on trucks, motor cars and similar installations. The amplifier contains two milliameters in the plate circuits of the 50 watt tubes, so that the separate performances of each tube may be noted.

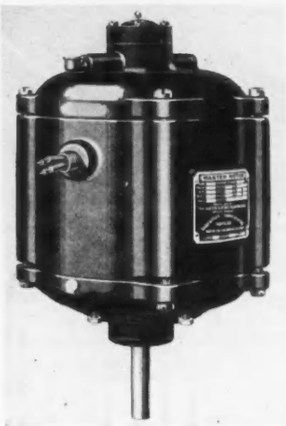
Projector Arc Lamp Rheostats

Shaefer Bros. Co., 1059 W. 11th St., Chicago, announces a line of projector arc lamp rheostats for use in theater work, particularly, to vary the arc lamp potential from 45 to about 65 volts. The rheostats are built in two types—for light and for

heavy current duty, and for line voltages of 85, 100 and 110 volts. The light duty type is built with porcelain tube resistances, and the heavy duty rheostats utilize special alloy cast-iron grids. The resistance is mounted inside an iron frame for floor mounting. The whole controller is finished in black enamel. A radial sliding brush of laminated copper is arranged to slide over a series of heavy copper contacts mounted on a slate inside a steel box enclosure. Three terminals are provided, the third being a connection for using the entire resistance bank in the circuit when the arc is being struck. Knock-outs are provided all around the steel box enclosure so that connections may be made from either side, top or bottom.

Explosion Resisting Motors

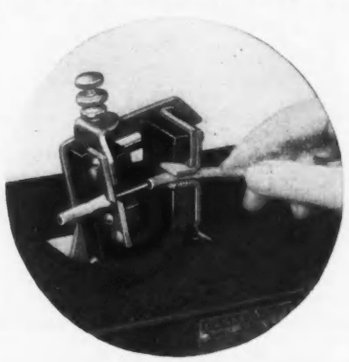
Master Elec. Co., Dayton, Ohio, announces an explosion resisting motor especially designed for use wherever explosive vapors are encountered, such as gasoline pumps, spray booths, dry cleaning plants,



gas plants, and in the manufacture of paint and varnish. These motors may be mounted either vertically or horizontally. Bearings are oversize. Interchangeable frames permit single phase, polyphase and direct current motors of the same horsepower, speed and current rating to be installed on the same mounting. This motor is available in sizes ranging from 1/8 to 1/3 hp. These motors will be designed for any particular application.

Wire Stripper

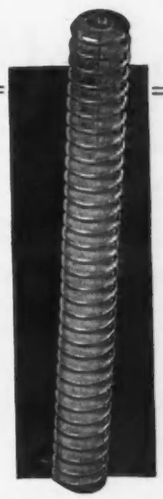
Pyramid Products Co., 2311 S. State St., Chicago, offers its E-Z wire stripper designed for rapid stripping of the finer types of insulated wire, used generally on all electrical appliances—from 12 gage to the very finest magnet wire. The feed is open at the side, as shown in the accompanying illustration. Stripping of stranded, solid core or parallel cord is accomplished by a single pedal movement. This machine can be used for either end or center stripping on either single or duplex cord. The size



of the stripping hole in the blades is increased or decreased instantly by a micrometer screw adjustment with locknut. The machine is also provided with a cutter. It occupies a bench space of 8 by 12 in. or a floor space of 18 by 18 in. The weight is 25 lb.

Porcelava

The best for Electric Heating Appliances



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Specialists in Porcelain

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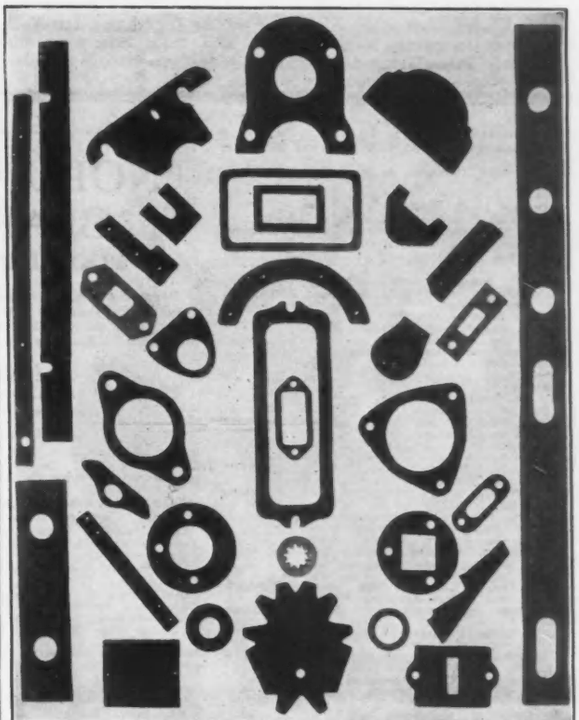

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Classified Index

MATERIALS, PARTS and EQUIPMENT

ON this and the following several pages is a monthly feature of ELECTRICAL MANUFACTURING, an alphabetically arranged classification of all materials, parts and equipment entering into the manufacture of the finished electrical product. Under each subject heading will be found the names of the manufacturers, local addresses and trade names of the products manufactured. Thus "Linolac" insulating varnish will be found in alphabetical position under the heading "Paint, Varnish, Lacquer."

A similar index of all finished electrical products for consumption or resale by wholesalers, contractors, contractor-dealers, central stations and industrial electricians, is a monthly feature of ELECTRICAL INSTALLATION RECORD.

ALLOYS, LIGHT METAL
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.

ALUMINUM
(Also Aluminum Bronze Powder.)
Albron, Alcoa, Alumac. See Aluminum Co. of America.
Aluminum Co. of America, 3444 Oliver Bldg., Pittsburgh.
Fairmont Aluminum Co., Fairmont, W. Va.

AMMETERS. See Instruments.

ARMATURE
Balancers. See Balancers, Armature.
Banding Machines. See Banding Machines, Armature
Bearings. See Bearings.
Buggies. See Lifts, Armature.
Coil Presses. See Presses, Armature Coil.
Coils. See Coils, Finished.
Core Punchings. See Discs, Armature.
Cranes. See Lifts, Armature.
Discs. See Discs, Armature.
Driers. See Ovens.
Growlers. See Testers, Coil.
Hoists. See Lifts, Armature.
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Jacks. See Lifts, Armature.
Laminations. See Discs, Armature.
Lathes. See Lathes.
Lifts. See Lifts, Armature.
New. See Coils, Finished.
Notching Machines. See Notching Machines, Armature.
Pegs. See Pegs, Armature.
Pinion Pullers. See Pullers, Armature Shaft.
Repaired. See Repairing and Second-Hand.
Shaft Pullers. See Pullers, Armature Shaft.
Shaft Straighteners. See Straighteners, Armature Shaft.
Stands. See Stands, Armature.
Test Benches. See Test Benches, Armature.
Testers. See Testers, Coil; also Test Benches, Armature.
Torpedo Cord. See Twine, Armature Winding.
Trouble Shooters. See Testers, Coil; also Test Benches, Armature.
Trucks. See Lifts, Armature.
Wedges. See Pegs, Armature.
Winding Machines. See Winding Machines, Armature & Field Coil.
Winding Twine. See Twine, Armature.

ARMATURE & COIL SPRAY GUNS. See Spraying Outfits

ARMATURE TWINES. See Twine, Armature.

ARMORING MACHINES. See Wire Manufacturing Machines.

ARMS, FLEXIBLE. See Tubing Flexible Metallic.

ASBESTOS
Shades. See Shades, Fabric.
Paper & Sheet. See Asbestos.
Slabs. See Asbestos Slabs.
Tape. See Tape, Asbestos.
Wire. See Wire, Insulated.
Yarn and Thread. See Yarn and Thread.

ASBESTOS
Sheet, Paper, Mill Board, Lumber.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
Easco. See Eastern Asbestos Co.
Eastern Asbestos Co., Providence, R. I.
Ferodo & Asbestos, Inc., New Brunswick, N. J
Johns-Manville Corp., 292 Madison Ave., New York, N. Y.

ASBESTOS SLABS
Slabs & Barriers for Switchboard.
Asbestos-Ebony. See Johns-Manville, Inc.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
Decelco, Inc., Wayne, Mich.
Electrobestos. See Johns-Manville Corp.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.
Transite. See Johns-Manville, Inc.
Zellite. See Decelco, Inc.

BAGS, Vacuum Cleaner
Merrimack Mfg. Co., Boston, Mass.

BAKELITE MOULDS. See Dies, Die Makers.

BALANCERS, Armature
(Dynamic Balancing Machines—Balancing Ways)
Armature Coil Equip. Co., 2415 Forestdale Ave., Cleveland, O. (Machine).
Bowsher Co., N. P., South Bend, Ind.
Olsen Lundgren. See Olsen Testing Machine Co.
Olsen Testing Machine Co., Tinius, 500 N. 12th St., Philadelphia, Pa. (Machines)
Sundstrand Machine Tool Co., Rockford, Ill.
Twentieth Century. See Sundstrand Machine Tool Co.
Vibration Specialty Co., 1534 Winter, Philadelphia, Pa. (Machines).

BALL BEARINGS. See Bearings, Ball and Roller.

BANDING MACHINES, Armature
Columbia Machine Wks. & Malleable Iron Co., 263 Chestnut Brooklyn, N. Y.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.
Sidlon Company, Frank, Boston, Mass.

BARRIERS, Switchboard. See Slate; also Soapstone; also Asbestos.

BARS, BUS. See Brass, Bronze & Copper; also Aluminum.

BARS, Commutator
Anaconda. See American Brass Co.
American Brass Co., Waterbury, Conn.
Buckeye Tempered Copper & Brass Co., Mansfield, O.
Cameron Electric Mfg. Co., Ansonia, Conn.
Commutator Co., 121 N. Front, Minneapolis, Minn.
Electric Materials Co., North East, Pa.

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Germantown, Philadelphia, Pa.

Eureka Metal Products Corp., 91 Clay, North East, Pa.
Homer Commutator Co., 4748 Hough Ave., Cleveland.
Home Brass & Copper Co., Div. of Revere Copper & Brass, Inc., Rome, N. Y.

BASES, Radio Tube. See Radio Molded Parts.

BASES, Reading Lamp
Metal, Pottery, Wood & Glass.
American Ring Co., Waterbury, Conn.
Aladdin Mfg. Co., 602 E. 18th, Muncie, Ind.
Camar Pottery, Camden, Ark.
Estes & Sons, E. B., 5844 Grand Central Terminal, New
Fulper Pottery Co., Flemington, N. J.
Globe Metal Spinning Co., 178 Centre, New York, N. Y.
Hemill Products, Inc., 103 Mott, New York, N. Y.
Insulation Mfg. Co., New York Ave. and Herkimer St., Brooklyn, N. Y.
Marblesri. See Insulation Mfg. Co.
Natural. See Insulation Mfg. Co.
Rodale Mfg. Co., Emaus, Pa.
Smith Glass Co., Wabash Ave., Hartford City, Ind.
Van Briggle Tile & Pottery Co., Colorado Springs, Colo.
Weller, S. A., Zanesville, O. (Pottery.)
Yekel Corp., 219 Homestead Ave., Hartford, Conn.
Zane Pottery Co., South Zanesville, O.

BATTERY CHEMICALS. See Chemicals, Battery.

BATTERY CUT OUTS. See Switches, Battery.

BATTERY GAGES. See Instruments, Pocket.

BATTERY JARS. See Jars, Battery, Glass; also Rubber; also Molded Insulation.

BATTERY OXIDES. See Chemicals, Battery.

BATTERY SALTS. See Chemicals, Battery.

BEAD CHAIN. See Chain, Socket.

BEADS. Chandelier. See Crystals, Chandelier.

BEADS, Insulating
American Lava Corp., 1423 William, Chattanooga, Tenn.
Durco. See Struthers Dunn, Inc.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.

BEARINGS
Ball & Roller. See Bearings, Ball & Roller.
Graphite. See Bearings, Oil-less.
Oil-less. See Bearings, Oil-less.
Sleeve. See Bearings & Bushings.

BEARINGS, Ball and Roller
Aetna Ball Bearing Mfg. Co., Chicago, Ill.
Ahlberg Bearing Co., 312 E. 29th, Chicago, Ill.
American Roller Bearing Co., Pittsburgh, Pa.
Auburn Ball Bearings Co., 57 Clarissa, Rochester, N. Y.
Ball & Roller Bearing Co., Danbury, Conn.
Bantam Ball Bearing Co., South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Commercial. See Schatz Mfg. Co.
C J B. See Ahlberg Bearing Co.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearing Co., Poughkeepsie, N. Y.
Gurney. See Marlin-Rockwell Corp.
Gwilliam Co., 360 Furman, Brooklyn, N. Y.
Hoffman. See Norma-Hoffman Bearings Corp.
Hoover Steel Ball Co., Ann Arbor, Mich.
Hyatt Roller Bearing Div. of General Motors Corp., Harrison, N. J.
McGill Metal Co., Valparaiso, Ind.
Marlin-Rockwell Corp., Gurney Ball Bearing Div., Jamestown, N. Y.
Mathews Mfg. Co., 104 Gold, Worcester, Mass.
New Departure Mfg. Co., Bristol, Conn.
Nice Ball Bearing Co. (Nicetown), Philadelphia, Pa.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Whitehead Rd., Trenton.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Schubert. See McGill Metal Co.

Ball and Socket Joint

INSULATORS
Ask for samples
STRUTHERS DUNN, INC.
134 North Juniper Street, Philadelphia, Pa.

S R B. See Standard Steel & Bearings, Inc.
Standard Steel & &Bearings, Inc., Div. of Marlin-Rockwell Corp., Plainville, Conn.
Strom Bearings Co., 4587 Palmer, Chicago, Ill.
S. K. F. Industries, 40 E. 34th, New York, N. Y.
Timken Roller Bearing Co., Canton, O.
Torrington Co., Torrington, Conn.
Zubler Bearings Co., 1321 W. Tioga, Philadelphia, Pa.

BEARINGS, Oil-Less
Argute Oilless Bearings Co., 149 Berkeley, Philadelphia, Pa.
B. M. C. See Burlington Metal Corp.
Bogert & Hopper, Inc., 225 Varick, New York, N. Y.
Bound Brook Oil-less Bearing Co., Bound Brook, N. J.
Burlington Metal Corp., Burlington, Wis.
Cleveland Graphite Bronze Co., 830 E. 72nd, Cleveland, O
Electric Railway Equipment Co., 80 Church, New York, N. Y.
Elreco. See Electric Railway Equipment Co.
Graphalloy. See Graphite Metallizing Co.
Graphite Metallizing Co., 1050 Nepperhan Ave., Yonkers, N. Y.
Lubrite. See Merriam Bros., Yonkers, N. Y.
Merriam Bros., 185 Amory, Boston, Mass.
Metal Saw & Machine Co., Springfield, Mass.
Moraine Products Co., First & Foundry Sts., Dayton, O.
Neveroil Bearing Co., Wakefield, Mass.
Nolu Oilless Bearing Co., 2 E. Johnson (Germantown), Philadelphia, Pa.
O. & S. Bearing Co., 315 S. Artillery, Detroit, Mich.
Reliance. See Metal Saw & Machine Co.
Seib Lignum-Vitae Woodturning Co., 98 Boyd Ave., Jersey City, N. J.
United States Graphite Co., Saginaw, Mich.

BEARINGS AND BUSHINGS
(For Armature Shafts.)
Ajax Metal Co., Philadelphia, Pa.
American Bronze Corp., Berwyn, Pa.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bunting Brass & Bronze Co., Toledo, Ohio.
Cadman Mfg. Co., G. W., Pittsburgh, Pa.
Damascus Bronze Co., Pittsburgh, Pa.
Durex. See Moraine Products Co.
Erie Bronze Co., 1832 Chestnut, Erie, Pa
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit,
Johnson Bronze Co., New Castle, Pa.
Lumen Bearing Co., Buffalo, N. Y.
Moraine Products Co., First & Foundry Sts., Dayton, O.
National Bearing Metals Corp., St. Louis, Mo.
United States Graphite Co., Saginaw, Mich.

BELTING, Chain Transmission. See Chain, Power Transmission.

BELTS, Rubber
Molded Cord Rubber Belts for Electrical Appliances.
Dayton Rubber Mfg. Co., Dayton, O.
Fay Rubber Products Co., Elyria, O.
Gilmer Co., L. H., Cottman & Keystone Sts. (Tacony), Philadelphia, Pa.

BENDERS, Coil Loop
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa
Segur. See Electric Service Supplies Co.

BENDING. See Punching & Bending.

BINDING POSTS. See Posts, Binding.

BLADES, Fan
Estes & Sons, E. B., 5844 Grand Central Terminal Bldg., New York, N. Y.
Reading Elec. Co., Inc., 24 Frankfort, New York, N. Y.
Torrington Mfg. Co., Torrington, Conn
BLOCKS, Terminal. See Terminal Blocks.

BLOWERS, Armature
For Dusting Out Motors.
Big Midget. See Sturtevant Co.
Breuer Elec. Mfg. Co., 852 Blackhawk, Chicago, Ill.
Clements Mfg. Co., 609 Fulton, Chicago, Ill.
Cyclone Portable Electric Blower Co., 222 N. 12th, Philadelphia, Pa.
Electric Blower Co., 352 Atlantic Ave., Boston 9, Mass.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Marvel. See Electric Blower Co.
Sanitator. See United Elec. Co.
Cadillac. See Clements Mfg. Co.
Standard Elecl. Tool Co., 1939 W. Eighth, Cincinnati, O.
Sturtevant Co., B. F. (Hyde Park), Boston, Mass.
Tornado. See Breuer Elec. Mfg. Co.
United Elec. Co., 1230 8th, Conton, O.
United States Elecl. Tool Co., 2488 W. Sixth, Cincinnati, O.

BLUESTONE. See Chemicals, Battery.

BOARD, Fuller. See Cloth and Paper.

BOARD, Press. See Cloth and Paper.

BOMBARDING MACHINES. See Machines, Lamp Making.

BOWL HOLDERS. See Fixture Fittings.

BOX & CABINET BUSHINGS. See Bushings, Box & Cabinet.

BOX BOARD
Container Corp. of America, 111 W. Washington, Chicago

BOXES, Fibre
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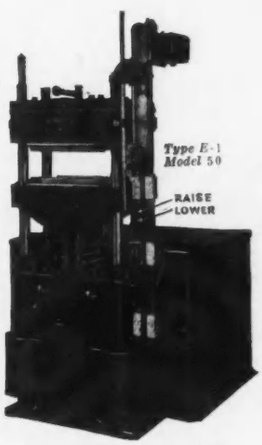

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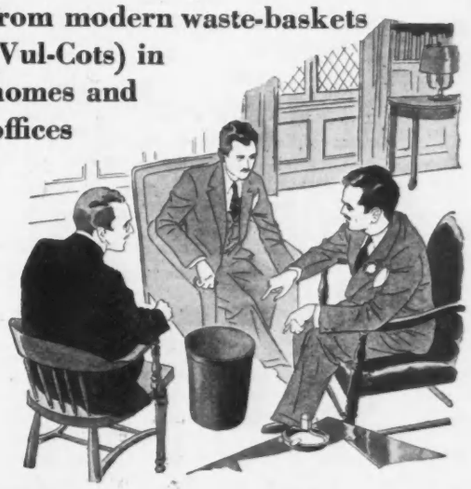

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Gator-Hide Kraft. See International Paper Co.
Hinde & Dauch Paper Co., 325 Decatur, Sandusky, Ohio.
Huntington Paper Box Co., Huntington, Ind.
International Paper Co., 100 E. 42nd, New York, N. Y.
Lake Lithographing Co., 2570 Superior Ave., Cleveland, O. (Display Cartons.)
National Folding Box Co., New Haven, Conn. (Cartons.)
Pequot Mfg. Corp., Glendale (L. I.), New York.
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Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Buffalo Bronze Die Cast Corp., 100 Arthur, Buffalo, N. Y.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass, Inc., 820 Orleans, Chicago, Ill.
Durbar. See Buffalo Bronze Die Cast Corp.
Electric Materials Co., North East, Pa.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit, Fredericksen Co., Saginaw, Mich.
Higgins Brass & Mfg. Co., Div. of Revere Copper & Brass, Inc., 12435 Dequindre, Detroit, Mich.
Johnson Bronze Co., New Castle, Pa.
Michigan Copper & Brass Co., Div. of Revere Copper & Brass, Inc., 5851 W. Jefferson Ave., Detroit, Mich.
Nickeloid. See American Nickeloid Co.
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BRIDGES, Wheatstone. See Instruments, Laboratory Standard.

BRONZE. See Brass, Bronze and Copper; also Castings.

BRONZE, Phosphor. See Phosphor Bronze.

BRONZE POWDER, Aluminum. See Aluminum.

BRUSH HOLDERS. See Brushes, Commutator.

BRUSHES, Carbon. See Brushes, Commutator.
Graphite. See Brushes, Commutator.
Metal Graphite. See Brushes, Commutator.

BRUSHES, COMMUTATOR
(Brushes, Brush Holders and Flexible Leads.)
Brush Holders ..... See H
Carbon, Graphite, Metal Graphite ..... See C
Flexible Leads and Pig Tails ..... See L
Sheet Metal ..... See S
Wire Gauze ..... See W
Automotive Mfg. Co., Kansas City, Mo. ..... H
B. B. B See Becker Bros. Elec'l Corp.
Baylis Co., Bloomfield, N. J. ..... H
Becker Bros. Elec. Corp., 23 N. Jefferson, Chicago, Ill. ..... C W S H L
Blanck & Carrier Corp., 115 W. 63rd, New York, N. Y. C
Boxill-Bruel Carbon Co., Columbia, O. ..... C ... H
Calebaugh Self-Lubricating Carbon Co., 1503 Columbia Ave., Philadelphia, Pa. C
Carbon Engrg. Co., Slinger, Wis. ..... C ... L
Carbon Laboratories Co., 5005 Euclid Ave., Cleveland, O. C
Carbon & Graphite Corp., 227 West Broadway, New York, N. Y. C
Carenco. See Carbon Engineering Co.
Chapin Co., Chas. E., 227 Fulton St., New York, N. Y. ..... C W S L
Columbia Machine Wks. & M. I. Co., 263 Chestnut, Brooklyn, N. Y. ..... H
Cooley Mfg. Co., 98 Park Place, New York ..... W
Diamond C. See Chapin Co., Chas. E.
Dixon Crucible Co., Monmouth St., Jersey City C
Electra. See Automotive Mfg. Co.
Electric Accessories Co., 310 York Ave., Philadelphia, Pa. ..... H
Electro-Nite Carbon Co., 308 N. Fourth, Philadelphia, Pa. C
Eurega Metal Products Corp., 91 Clay, North East, Pa. ..... W S H
Fleck Carbon Co., 505 Broome, New York. C W ... L
General Cable Corp., 420 Lexington Ave., New York, N. Y. ..... W ... L
General Electric Co., Schenectady, N. Y. .... C ... H
Graphalloy. See Graphite Metalizing Corp.

Graphite Metalizing Corp., 1050 Nepperhan Ave., Yonkers, N. Y. ..... C ... H
Henrite Products Co., 98 Park Place, New York, N. Y. C
Holland Trolley Supply Co., 1623 E. 43rd, Cleveland, Ohio ..... H
Keystone Carbon Co., 4630 N. 11th, Philadelphia, Pa. C
Kohlenite Products Co., 92-34 152nd St., Jamaica, N. Y. C
Le Carbone Co., 15th St., Hoboken, N. J. C
Le Valley Vitae Carbon Brush Co., 4851 Grand Central Terminal, New York, N. Y. C
Marks Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich. C
Morganite Brush Co., 33-02 48th Ave., Long Island City, N. Y. C
National Carbon Co., Cleveland, O. C
New Process Carbon Co., 1503 Columbia Ave., Philadelphia, Pa. ..... C ... L
No Spark. See Calebaugh Self-Lubricating.
Ohio Carbon Co., 12508 Almira Ave., Cleveland, Ohio ..... C W ... L
Ohio Elec. Specialty Mfg. Co., Troy, O. ..... W ...
Perfection Supply Co., 98 Park Pl., New York, N. Y. ..... C W S H L
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Pure Carbon Co., Wellsville, N. Y. ..... C W S ... L
Pyramid. See National Carbon Co.
Reaction. See Baylis Co.
Reading Elec. Co., Inc., 24 Frankfort, New York, N. Y. ..... C ... L
Salem Electrical Supply Co., 285½ Bridge, Salem, Mass. ..... W ...
Snarr & Co., Geo. W., 110 S. Ninth, St. Louis, Mo. C
Speer Carbon Co., St. Mary's, Pa. C
Stackpole Carbon Co., St. Mary's, Pa. C
Sterling. See Carbon Laboratories Co.
Superior Carbon Products Co., North Rd., Poughkeepsie, N. Y. C
U. S. Graphite Co., Saginaw-Mich. C
Universal. See Graphite Metalizing Corp.
Weber Elec. Wks., Brooklyn Sta., Cleveland. C ... L

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BUGGIES. Armature. See Lifts, Armature.

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BUNCHING MACHINES. See Wire Manufacturing Machines.

BUS BAR. See Brass, Bronze and Copper. Also Aluminum.

BUSHINGS, SHAFT. See Bearings and Bushings.

BUSHINGS, Box and Cabinet, Porcelain
Appleton Electric Co., 1703 Wellington Ave., Chicago, Ill.
Columbia Metal Box Co., 226 E. 144th St., New York, N. Y.
Harter. See Multi Elecl. Mfg. Co.
Knox Porcelain Corp., Knoxville, Tenn.
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Multi Electric Mfg. Co., 1840 W. 14th Ave., Chicago, Ill.
Nelson Elec. Co., Plant City, Fla.

CABINET GRILL CLOTH. See Cloth, Untreated.

CABINETS, Fibre
Continental-Diamond Fibre Co., Newark, Del.
Vulcanwood. See Continental-Diamond Fibre Co.

CABINETS, Refrigerator. See Refrigerator Cabinets.

CABINETS, Sheet Steel
Stamped and Turned-up Boxes and Cabinets.
Acme Blow Pipe & Sheet Metal Wks., 713 Magazine, New Orleans, La.
Adam Electric Co., Frank, St. Louis, Mo.
All-Steel-Equip. Co., Aurora, Ill.
American Metal Wks., 4865 Stenton Ave., Philadelphia, Pa.
American Steel Furniture Co., 27 W. 24th, New York, N. Y.
Artisan Sheet Metal Corp., 53 Gorham, Rochester, N. Y.
Benjamin Elec. Co., W. A., 1378 E. 16th, Los Angeles, Cal.
Berthold Elec. Co., Gus, 551 W. Monroe, Chicago, Ill.
Bessell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Chicago Hdwe. Foundry Co., North Chicago, Ill.
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Columbian Steel Tank Co., 1505 W. 12th, Kansas City, Mo.
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Holzer Sheet Metal Wks., Inc., 317 Burgandy, New Orleans, La.
Isert Co., J. H., 1234 Rowan, Louisville, Ky.
Karp Metal Products Co., 129 30th, Brooklyn, N. Y.
Large-Dail Mfg. Co., 311 N. Tenth, Philadelphia.
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MacMillen Mfg. Co., 1400 N. Spring, Los Angeles, Cal.
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Metropolitan Elec. Co., 2914 First Ave., S., Seattle, Wash.
Metropolitan Elec. Products Co., Blvd. at 14th, Long Island City, N. Y.
Milwaukee Vault & Cabinet Co., 521 Market, Milwaukee.
Mosher, S. L., 1951 Lawrence, Denver, Colo.
National Metal Box Co., Van Dyke & Ferris Sts., Brooklyn.
Newman Elec. & Mfg. Co., Eau Claire, Wis.
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Penn Electrical Co., 35 Water, Irwin, Pa.
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Rezioh. See Holzer Sheet Metal Works.
Robbins & Myers Sales, Inc., Springfield, O.
Security. See Aurora Steel Products Co.
Standard Metal Box Corp., 950 Grand St., Brooklyn, N. Y.
Star Metal Box Co., 238 46th, Brooklyn, N. Y.
Superior Switchboard & Devices Co., 420 Schreyer Ave., Canton, O.
Tanner & Co., Wm. F., 511 S. Sharp, Baltimore, Md.
United Mail Box Co., 473 President, Brooklyn, N. Y.
United Sheet Metal Wks., 575 Howard, San Francisco.
Universal Metal Box & Products Co., 316 Coit, Irvington, N. J.
Wadsworth Elec. Mfg. Co., Covington, Ky.
Wiegman & Co., E. M., 1908 Benton, St. Louis, Mo.
Wurdack Elec. Mfg. Co., 4444 Clayton Ave., St. Louis, Mo.

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Accurate Molding Corp., 20 Morton, Brooklyn, N. Y.
Adler Mfg. Co., Louisville, Ky.
Adler Royal. See Adler Mfg. Co.
Ampere. See Donehue Lumber Co.
Art Woodworking Co., Inc., 1035 Seattle Blvd., Seattle.
Bonfin Cabinet Co., J., 2216 W. 63rd St., Cleveland, O.
Carion. See Art Woodworking Co.
Carolina Wood Products Co., Asheville, N. C.
Carrom Co., Ludington, Mich.
Caswell-Runyon Co., Huntington, Ind.
Cary Cabinet Corp., 1427 N. 15th, St. Louis, Mo.
Cheney Piano Action Co., A. C., Castleton, N. Y.
Chickasaw Furniture Mfg. Co., Memphis, Tenn.
Conrades Mfg. Co., 1942 N. Second, St. Louis, Mo.
Conner Furniture Co., New Albany, Ind.
Continental Radio Corp., East Pontiac, Extended, Fort Wayne, Ind.
Corbett Cabinet Mfg. Co., St. Mary's, Pa.
Cory Cabinet Corp., Springfield, Mo.
Deiker Co., Geo., Henderson, Ky.
Ebert Furniture Co., 225 W. 34th, New York, N. Y.
Efein & Sons, Frederick, 44 Central Ave., Brooklyn, N. Y.
Empire-United Hat Block Co., 312 E. 22nd, New York.
Estes & Sons, E. B., 5844 Grand Central Terminal Bldg., New York, N. Y.
Excello Products Corp., 4836 W. 16th (Cicero), Chicago, Ill.
Federal Wood Products Corp., 206 Lexington Ave., New York, N. Y.
Grand Rapids Furniture Co., Grand Rapids, Mich.
Harper Mfg. Co., Cassopolis, Mich.
Hickory Box Co., Hickory, N. C.
Hubbell, H. L., 59 Market Ave., N. W., Grand Rapids.
Interstate Woodworking Co., 44 Wooster, New York, N. Y.
Karpen. See Studner Bros.
King Mfg. Corp., 254 Rano, Buffalo, N. Y.
Klumpp Sons, John G., 13 Baxter, New York, N. Y.
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National Cabinet Co., New Philadelphia, O.
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Radio Cabinet & Equipment Co., 1504 Vine, Philadelphia
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Radio Master Corp., Bay City, Mich.
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Temier Bros., 355 Bridge, Northampton, Mass. (Radio.)
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Udell Wks., 28th and Barnes Ave., Indianapolis Ind.
Watsontown Table & Furniture Co., Watsontown, Pa.
West Box Co., 235 Liberty, Springfield, Mass
Wood Cabinet Corp., 196 Lexington Ave., New York, N. Y.

CABLE ARMORING MACHINES. See Wire Manufacturing Machines

CABLE TEST SETS. See Instruments, Portable and Switchboard.

CABLING MACHINES. See Wire Manufacturing Machines

CANDLES, Fixture
Glass, Fibre Paper.
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Cleveland Container Co., 10330 Berea Rd., Cleveland, O.
Fibro Products Co., New Bedford, Mass.
Franklin Fibre Specialty Co., 173 Lafayette, New York, N. Y.
Phoenix Glass Co., Monaca, Pa.
Remington Mfg. Co., 939 Barnum Ave., Bridgeport, Conn.
Seamless. See Fibro Products Co.
Universal Brass Wks., 209 Vine, Philadelphia, Pa.

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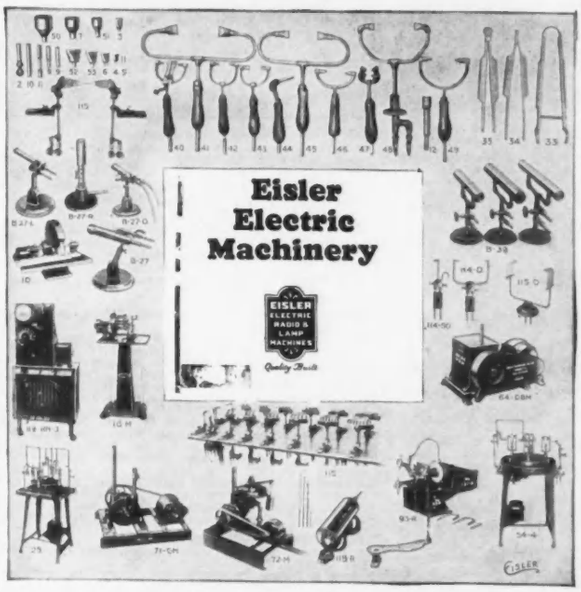

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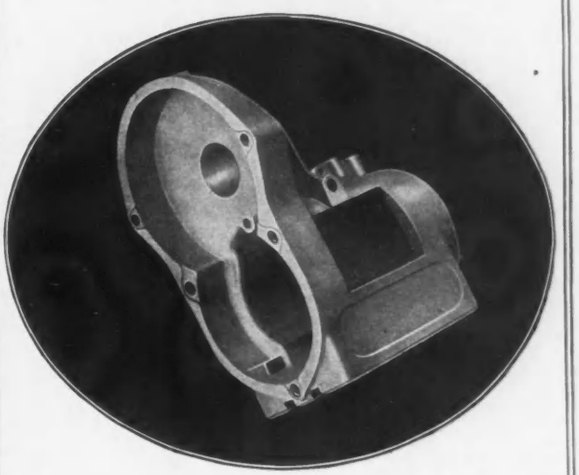

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Arc Light. See Carbons.

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Columbia. See National Carbon Co.
Daylight. See National Carbon Co.
Lessing. See Blanck & Carrier Corp.
Nuernberg. See Blanck & Carrier Corp.
National Carbon Co., Cleveland Ohio.
Oretip. See National Carbon Co.
Speer Carbon Co., St. Mary's, Pa.
Stackpole Carbon Co., St. Mary's, Pa.
White Flame. See National Carbon Co.
CARTONS. See Boxes and Wrappers.
CASEIN PLASTICS. See Molded Insulation.
CASES, Eliminator. See Cases, Eliminator.
Flashlight. See Cases, Flashlight.

CASES, Eliminator
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Grand Sheet Metal Wks., 176 Grand, New York, N. Y.
Karp Metal Products Co., 129 30th, Brooklyn.
Luna Metal Products Co., 38 Emerson Pl., Brooklyn, N. Y.

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Lincoln Fibre Specialty Co., Newport, Del.
St. Louis Paper Can & Tube Co., St. Louis, Mo.
CASTINGS, Aluminum. See Castings, Aluminum. Also
Castings, Copper, etc.
Brass. See Castings.
Bronze. See Castings.
Copper. See Castings.
Die. See Castings, Die.
Monel Metal. See Castings.
Steel. See Castings, Steel.
White Metal. See Castings.

CASTINGS, Aluminum
American Aluminum Ware, 265 Jelliff Ave., Newark, N. J.
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
Bergen Point Brass Foundry, Sixth & Ave A, Bayonne, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Dick Bros., Inc., Reading, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa.
Fairmont Aluminum Co., Fairmont, W. Va.
Monarch Aluminum Ware Co., 9301 Detroit Ave., Cleveland.
National Bronze & Aluminum Foundry Co., 88th & Lexy, Cleveland, O.
Quality Aluminum Casting Co., Waukesha, Wis.
Sterling Die Casting Co., 749 39th, Brooklyn, N. Y.
Tenual. See National Bronze & Aluminum Foundry Co.
United Metal Mfg. Co., Inc., 25 Shipping, Norwich, Conn.
Veco Mfg. Co., South Norwalk, Conn.

CASTINGS, Die
Alemite Die-Casting & Mfg. Co., Woodstock, Ill.
Allied Die-Casting Corp., 43rd Ave. from 38th to 39th, Long Island City, N. Y.
Alumac. See Aluminum Co. of America.
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
American Die Casting Co., 2040 Dominick, Chicago, Ill.
Badger Die Casting Co., 155 Buffalo, Milwaukee, Wis.
Barnhardt Bros. & Spindler, Monroe & Throop St., Chicago.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.
Do-Di. See Doehler Die Casting Co.
Doehler Die Casting Co., 386 Fourth Ave., New York, N. Y.
Franklin Die Casting Corp., 826 Gifford, Syracuse, N. Y.
Illinois Die Castings Co., 551 W. Congress, Chicago, Ill.
Krone-Seebek Die Casting & Mfg. Co., 2935 W. 47th, Chicago, Ill.
Milwaukee Die Casting Co., 289 Fourth, Milwaukee, Wis.
National Die Casting Co., 800 N. Albany Ave., Chicago.
Newton Die Casting Corp., 146 Munson, New Haven Conn.
Paragon Die Casting Co., 2701 N. Crawford Ave., Chicago.
Parker White Metal & Machine Co., Erie, Pa.
Permite. See Aluminum Industries, Inc.
Phoenix Die Castings Co., 21 Illinois, Buffalo, N. Y.
Pittsburgh Die Casting Co., 7508 Ardmore, Swissvale, Pa.
Precision Die Casting Corp., Syracuse, N. Y.
Republic Die Casting Co., 128 Mott, New York, N. Y.
Stewart Die Casting Co., 4500 Fullerton Ave., Chicago, Ill.
Superior Die Casting Co., 875 E. 70th, Cleveland, Ohio.
Twin City Die Castings Co., Talmadge and 33rd Aves., S. E., Minneapolis, Minn. (White Metal).

CASTINGS, Gray Iron
American Engineering Co., Philadelphia, Pa.
Athens Foundry Co., Athens, Pa.
Barlow Foundry Co., 551 N. J. R. R. Ave., Newark, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Bridgeport Castings Co., 250 North Ave., Bridgeport, Conn.
Chicago Hardware Foundry Co., North Chicago, Ill.
Dick Bros., Inc., Reading, Pa.
Fairmount Foundry, Inc., Third & Westmoreland Sts., Philadelphia, Pa.
Farquhar Co., Ltd., A. B., York, Pa.
Forest City-Walworth Run Foundries Co., 2500 W. 27th, Cleveland, O.
Gray Iron Foundry Co., Reading, Pa.
Laytham & Son Co., Wm. P. 889 Market, Paterson, N. J.
Milwaukee Grey Iron Foundry Co., 3910 Mitchell, Milwaukee, Wis.
North Lebanon Foundry Co., Second & Canal, Lebanon, Pa.
North Wales Mach. Foundry Co., North Wales, Pa.
Products Machine Co., Bridgeport, Conn.
Sacks Iron Foundry, L., 357 Wilson Ave., Newark, N. J.
Sharples Separator Co., Biddle & Patten Ave., Westchester, Pa.
Snead & Co., Pine St., Jersey City, N. J.
Union Mfg. Co., New Britain, Conn.
Western Foundry Co., Kedzie Ave. at 36th, Chicago, Ill.

CASTINGS, Malleable Iron
Eastern Malleable Iron Co., Naugatuck, Conn.
St. Louis Malleable Castings Co., 7701 N. Conduit Ave., St. Louis, Mo.

CASTINGS, Non-Ferrous
Copper, Brass, Bronze, Monel Metal, White Metal.
Anderson Mfg. Co., Albert & J. M., 289 A Boston, Mass.
American Manganese Bronze Co., Holmesburg, Philadelphia.
Atlas Brass Foundry Co., Columbus, O.
Barnard Foundry Co., 9 Roseland, Springfield, Mass.
Bergen Point Brass Foundry, Sixth & Ave A, Bayonne, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Buffalo Bronze Die Cast Corp., 100 Arthur, Buffalo, N. Y.
Bridgeport Castings Co., 250 North Ave., Bridgeport, Conn.
Cadman Mfg. Co., A. W., Pittsburgh, Pa.
Central Pattern & Foundry Co., 3737 S. Sacramento Ave., Chicago, Ill.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Hardware Foundry Co., North Chicago, Ill.
Creamer & Co., W. G., 572 Smith, Brooklyn, N. Y.
Davis & Zuckerman, 514 E. 11th, New York, N. Y.
Delta Star Electric Co., 2437 Fulton, Chicago, Ill.
Dick Bros., Inc., Reading, Pa.
Erie Bronze Co., 1832 Chestnut, Erie, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa.
Faries Mfg. Co., Decatur, Ill.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit.
Harsch Bronze & Foundry Co., John, 11612 Madison Ave., Cleveland, O.
Johnson Bronze Co., New Castle, Pa.
Metsil Metal Co., Valparaiso, Ind.
National Bronze & Aluminum Foundry Co., 88th & Lexy, Cleveland, O.
Ohio Pattern Wks. & Fdy. Co., 2730 Spring Grove Ave., Cincinnati, O.
Rabun Bronze Foundry, 617 West Belgrave, Huntington Park, Cal.
Tenual. See National Bronze & Aluminum Foundry Co.
United Metal Mfg. Co., Inc., 25 Shipping, Norwich, Conn.
Walden Tool & Metal Mfg. Co., 3 Oxford, New Haven, Conn.

CASTINGS, Steel
Bonney-Floyd Co., Marion Rd., Columbus, Ohio
Eastern Steel Casting Co., Ave. L & Edward St., Newark.
Northwestern Steel & Iron Corp., 2907 Fourth, S. E., Minneapolis, Minn.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Precisn. See Northwestern Steel & Iron Corp.
Riverside Steel Casting Co., Jacobus Ave., Kearney, N. J.
Stryker Steel Castings Co., Milwaukee, Wis.

CEMENT, Commutator
Anchorlute. See Technical Products Co.
Commutator Companion. See Withington Div. of Marmot Co.
Conductalute. See Technical Products Co.
Early, Edward E., 1129 W. Fifth, N. W., Canton, O.
Fixkwick. See Technical Products Co.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Electric Co.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Mitchell Rand Mfg. Co., 19 Vesey, New York, N. Y.
Perce-Lute. See Perfection Supply Co.
Perfection Supply Co., 98 Park Pl., New York, N. Y.
Plas Mica Co., 26 St. Andrews Place, Yonkers, N. Y.
Porce-Lute. See Perfection Supply Co.
Technical Products Co., Pittsburgh, Pa.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Withington Div. of Marmot Co., 50 Thayer, Boston, Mass.

CEMENT, Liquid Porcelain
Anchorlute. See Technical Products Co
Color-Bestos. See Technical Products Co.
Fire Lute. See Technical Products Co.
Insa-Lute. See Technical Products Co.
Okonite Co., Passaic, N. J.
Patch-O-Namel. See Technical Products Co.
Repairet Mfg. Co., Milwaukee, Wis.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Technical Products Co., Pittsburgh, Pa.
Thermold. See Technical Products Co.
CHAIN, Chandelier (Fancy). See Crystals, Chandelier.
CHAIN DRIVES. See Chain, Power Transmission.

CHAIN, Fixture
Acco. See American Chain Co.
American Chain Co., Bridgeport, Conn.
Chase Brass & Copper Co.
Eastern Chain Works, 309 E. 22nd St., New York, N. Y.
Faries Mfg. Co., Decatur, Ill.
Globe Metal Mfg. Co., Haggert & Emerald Sts., Philadelphia, Pa.
H. & O. Chain Co., So. Norwalk, Conn.
Newark Metal Mfg. Co., 22 S. 6th, Newark, N. J.
Plume & Atwood Mfg. Co., Waterbury, Conn.
Rodale Mfg. Co., Emaus, Pa.
Steele & Johnson Mfg. Co., Waterbury, Conn.
Universal Metal Chain Co., 75 Clymer, Brooklyn, N. Y.

CHAIN, Power Transmission
Baldwin Chain & Mfg. Co., Worcester, Mass.
Boston Gear Wks. Sales Co., Norfolk Downs, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Frolland Chain & Mfg. Co., Springfield, Mass.
Link-Belt Company, 910 S. Michigan Ave., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Ramsey Chain Co., Inc., Albany, N. Y.
Reeves Pulley Co., Columbus, Ind.
Renold Boston. See Boston Gear Wks.
Union Chain & Mfg. Co., Sandusky, O.
Whitney Mfg. Co., Hartford, Conn.

CHAIN, Socket
American Ball Chain Works, 12 Wooster St., New York.

COLOR-BESTOS FIREPROOF ACIDPROOF OILPROOF
An insulating cement or paint made in standard colors including white.
Trial ½ gal can $2.00
TECHNICAL PRODUCTS COMPANY
Makers of Insa-Lute Liquid Porcelain
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"GRAY" Heater Plug Clips

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Gray Brothers, Inc.
Plano, Ill.

Read Chain Mfg. Co., Bridgeport, Conn.
H. & O. Chain Co., South Norwalk, Conn.
CHANDELIER BEADS. See Crystals, Chandelier.
CHANDELIER CRYSTALS. See Crystals, Chandelier.
CHANDELIER FRINGE. See Crystals, Chandelier.

CHARGERS, Magnet
Charging, Remagnetizing.
Colpin Corp., 6110 S. Main, Los Angeles, Cal.
Pure Elec. Mfg. Co., 5255 Wabada Ave., St. Louis, Mo.
Luma Elec. Equipment Co., Toledo, O.
Scintilla Magneto Co., Inc., Sidney, N. Y.
Valley Electric Co., 4221 Forest Park Blvd., St. Louis, Mo.

CHEMICALS, Battery
Electrolyte, Battery Salts, Battery Oxides, Sal Ammoniac, Bluestone, Manganese.
Cooper & Co., Charles, 194 Worth, New York, N. Y.
Elmer & Amend, 205 3rd Ave., New York, N. Y.
Electrex. See Goodyear Chemical Co., Inc.
Electro Chemical Co., 113 W. Court St., Dayton, O.
General Metallic Oxides Co., Jersey City, N. J.
Globe Chemical Co. Murray Rd. and Big Four R. R., (St. Bernard), Cincinnati, O.
Goodyear Chemical Co., Inc., 20 W. 22nd, New York, N. Y.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Kalbfleisch Corp., 200 5th Ave., New York, N. Y.
Klipstein Co., 644 Greenwich, New York, N. Y.
Lightning Co., St. Paul, Minn.
Merrimac Chemical Co., 148 State, Boston, Mass.
Powers-Weightman-Rosengarten Co., Philadelphia, Pa.
Voltah. See Powers-Weightman-Rosengarten Co.
Wah Chang Trading Corp., 233 Broadway, New York, N. Y.

CHEMICALS, Refrigeration
Arctic. See Roessler & Hasslacher Chemical Co.
Calco Chemical Co., Bound Brook, N. J.
Carbide & Carbon Chemicals Corp., 30 E. 42nd, New York, N. Y. (Butane & Isobutane.)
Dry Ice Corp. of America, 50 E. 42nd, New York, N. Y.
Roessler & Hasslacher Chemical Co., 709 Sixth Ave., New York, N. Y. (Methyl Chloride, Ethyl Chloride.)
Virginia Smelting Co., West Norfolk, Va. (Sulphur Dioxide.)
Chromium Plating. See Plating & Finishing.

CHUCKS, Magnetic
J & H Elec. Co., 200 Richmond, Providence, R. I.
Simmons. See Taft-Pierce Mfg. Co.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Walker Co., O. S. (Rockdale), Worcester, Mass.

CIRCUIT BREAKERS
Air and Oil Circuit Breakers and Oil Break Switches.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Anderson Mfg. Co., Albert & J. M., 289 A St., Boston, Mass.
Asco. See Automatic Switch Co.
Automatic Reclosing Circuit Breaker Co., Columbus, O.
Automatic Switch Co., 154 Grand, New York, N. Y.
Burkaw, Inc., 30 Court, Newark, N. J.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Condit Elec'l Mfg. Corp., 842 Summer St. (South Boston), Boston, Mass.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee. (Mercury Type).
Domestic Elec. Co., Kent, O.
General Electric Co., Section W-329, Bridgeport, Conn.
Hart & Hegeman Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Hartman Electrical Mfg. Co., 31 E. Fifth, Mansfield, Ohio.
Heinemann Electric Co., Penn Ave. & Plum, Trenton, N. J.
High Tension Elecl. Specialty Co., 500 Washington, Abington, Mass.
Hitesco. See High Tension Elecl. Specialty Co.
H. & H. See Hart & Hegeman Div.
Inducto-therm. See Allen-Bradley Co.
I. T. E. Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia, Pa.
Line Material Co., South Milwaukee, Wis. (Oil Switches.)
Maple Co., R. H., 3156 Ruckle, Indianapolis, Ind.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Minibraker. See Burke Controller Co.
Re-Cirk-It. See Heinemann Elec. Co.
Roller-Smith Co., 220 Broadway, New York, N. Y.
Sentinel. See Westinghouse Elec. & Mfg. Co.
Takamine Corp., 3510 36th Ave., Long Island City, N. Y.
Time-O-Stat Controls Co., Elkhart, Ind.
U-Re-Lite. See I. T. E. Circuit Breaker Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
CIRCUIT TESTERS. See Testers, Fuse and Circuit
CLEANER BAGS, Vacuum. See Bags, Vacuum Cleaner
CLEANER BRUSHES, Vacuum. See Brushes for Vacuum Cleaners.

CLEANERS, Metal
Oakite Products, Inc., 26 Thames, New York, N. Y.
CLIPS, Fuse. See Fuse Clips.

CLIPS, Heater Plug
Gray Bros., Inc., Plano, Ill.
CLOCK SWITCHES. See Switches, Time.
CLOTH GEARS. See Gears and Pinions, Composition.
CLOTH LOUD SPEAKER DIAPHRAGM. See Cloth, Untreated.
CLOTH RADIO GRILL. See Cloth, Untreated.

CLOTH, Untreated
Boyle & Co., John, 112 Duane, New York, N. Y.
Canvas, "Aeroplane Cloth," Cotton Duck, Drill, Diaphragm Cloth, Grill Fabrics, etc.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pindall Fabrics Corp., 200 Madison Ave., New York, N. Y. (Grill Cloth)
Walker Cotton Fabrics Co., 327 S. La Salle, Chicago, Ill.

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WARD LEONARD ELECTRIC CO.
31-41 South St. Mount Vernon, N. Y.

CLOTH, WIRE
(For Radio Tube Screens)
Buffalo Wire Works Co., 588 Terrace, Buffalo, N. Y.

CLOTH AND PAPER, Insulating
Cloth, Insulated ..... See C
Paper, Insulated ..... See P
Fibre Paper (Fish Paper) ..... See F
Press Board (Fuller Board) .... See B
Silk ..... See S

Acme Wire Co., New Haven, Conn. ..... C S P
Armco. See Rogers Paper Mfg. Co.
Armatite. See Mica Insulator Co.
Behr-Manning Corp., Troy, N. Y. ..... P
Brand & Co., Wm., 268 4th Ave., New York ..... P
Campbellite. See National Vulcanized.
Carboloid Products Corp., 98 Front, Brooklyn, N. Y. ..... C P
Case Brothers, Inc., Highland, Park, Conn. ..... P
Case Mfg. Co., Unionville, Conn. ..... P
Case & Risley Press Paper Co., Oneco, Conn. ..... P
Cellma. See Tarentum Paper Mills Co.
Celoron Co., Div. of Continental Diamond Fibre Co., Bridgeport, Pa. ..... P F B
C-F. See National Vulcanized Fibre Co.
Columbian Rope Co., Auburn, N. Y. ..... P
Continental-Diamond Fibre Co., Newark, Del. ..... P
Consumers Rubber Co., 1302 Ontario, N., Cleveland, O. ..... P
Coruco. See Consumers Rubber Co.
De Jonge & Co., Louis, 69 Duane, New York, N. Y. (Condenser) ..... P
Dexstar. See Dexter & Sons.
Dexter & Sons, C. H., Windsor Locks, Conn. (Condenser Tissue.) ..... P
Dielectric Mfg. Co., St. Louis, Mo. ..... C S P
Electra. See Tarentum Paper Mills Co.
Electrite. See West Virginia Pulp & Paper Co.
Fybervid. See Wilmington Fibre Specialty Co.
General Electric Co. Section W-329 (Merchandise Dept.), Bridgeport, Conn. ..... C P
Hartford City Paper Co., Hartford City, Ind. (Glassine Condenser Tissue).
Hewitt & Bros., C. B., 16 Ferry, New York C P
Hi-Tex. See Stevens Paper Mills.
Hollingsworth & Vose Co., 333 Washington, Boston, Mass. ..... P
Imella. See Tarentum Paper Mills Co.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y. ..... F
Manning Paper Co., J. A., Troy, N. Y. ..... B
Mica Insulator Co., 200 Varick, New York C S P B
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y. ..... C S P F B
National Vulcanized Fibre Co., Wilmington, Del. ..... F
New Jersey Wood Finishing Co., Amboy Ave., Woodbridge, N. J. C
Ohmoid. See Wilmington Fibre Specialty Co.
Old Hick. See Hewitt & Bros., C. B.
Peerless. See National Vulcanized Fibre Co.
Riegel Paper Corp., 342 Madison Ave., New York, N. Y. ..... P
Rogers Paper Mfg. Co., So. Manchester, Conn. ..... B
Schweitzer, Inc., Peter J., 200 Fifth Ave., New York, N. Y. (Condenser Tissue.)
Sico. See Standard Insulation Co.
Spaulding Fibre Co., Tonawanda, N. Y. ..... F
Standard Insulation Co., East Rutherford, N. J. ..... C S P
Sterling Fireboard Co., 501 Fifth Ave., New York. (Varised Hard Fireboard) ..... B
Sterlite. See Sterling Firebrand Co.
Stevens Paper Mills, Windsor, Conn. ..... B
Tarentum Paper Mills Co., Tarentum, Pa. ..... P
Turbonite. See Brand & Co., Wm.
Union Mills Paper Mfg. Co., New Hope, Pa. ..... P
West Virginia Pulp & Paper Co., 230 Park Ave., New York ..... B
Wilmington Fibre Specialty Co., Wilmington, Del. ..... P

CLUTCHES, Magnetic
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis

COIL. (Coils).
Armature and Field. See Coils, Finished.
Choke (Radio). See Radio Circuit Components.
Driers & Impregnators. See Ovens.
Electromagnet. See Coils, Finished.
Flatteners. See Rolls, Coil Flattening.
High Frequency. See Electro-Therapeutic; also Radio Circuit Components; also Ignition Outfits.
Impregnators, Vacuum. See Ovens, Industrial.
Induction. See Coils, Finished; also Electro-Therapeutic.
Loop Benders. See Benders, Coil Loop.
Medical. See Electro-Therapeutic.
Presses. See Presses, Armature Coil.
Radio. See Radio Circuit Components.
Removers. See Removers, Coil.
Resistance. See Units, Rods & Grids; also Radio Circuit Components.
Spark. See Ignition Outfits.
Spreaders. See Winding Machines, Armature and Field.
Tamping Tools. See Tools, Coil Tamping.
Taping Machines. See Taping Machines, Coil.
Testers. See Testers, Coil; also Test Benches, Armature.
Winders, Armature & Field Coil. See Winding Machines, Armature & Field Coil.
Winders, Induction Coil. See Winding Machines, Induction Coil.
Winding Forms. See Forms, Coil Winding.
Windings (Magneto). See Coils, Finished.
Wire Tension Devices. See Tension Devices, Coil Wire.

COILS, Finished
Armature, Field, Electromagnet and Induction Coils.
Acme Wire Co., New Haven, Conn.
Aero Products, Inc., 4611 Ravenswood Ave., Chicago, Ill.
Anderson & Co., C. J., 213 W. Austin Ave., Chicago, Ill.
Armature Co., 7500 Stanton, Cleveland, Ohio
Auth Electrical Specialty Co., 422 E. 53rd St., New York.
A. & A. See Electrical Coil Winding Co.
Belden Mfg. Co., 4633 W. Van Buren, Chicago, Ill.
Bunnell & Co., J. H., 215 Fulton, New York, N. Y.
Burke Controller Co., 300 Lexington Ave., New York, N. Y.
Coils, Inc., 1183 Eddy, Providence, R. I.
Concourse Electric Co., 294 E. 137th, New York, N. Y.
Ditmar Elec. Co., Brookline, Mass.
Easton Coil Co., Easton, Pa.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O.
Electric Valve Mfg. Co., 64 Murray, New York, N. Y.
Electrical Coil Winding Co., 2735 Saunders, Camden, N. J.
General Cable Corp., 420 Lexington Ave., New York, N. Y.
Globe Technollan Corp., Reading, Mass.
Inca Mfg. Co., Fort Wayne, Ind.
Kurman Engineering Corp., 29 East End Ave., New York.
Marion Elec. Mfg. Co., 24 Cliff, Jersey City, N. J.
Mignon Elec. Corp., 909 Genesee, Buffalo, N. Y.
National Armature & Elec. Works, Bluefield, W. Va.
National Elec. Corp., 226 High, Newark, N. J.
Palmer Corp., Chas., 786 Broad, Newark, N. J. (Solenoids.)
Polymet Mfg. Corp., 829 E. 134th St., New York, N. Y.
Power Transformer Co., 145 W. 22nd, New York, N. Y.
Reliance Mfg. Co., W. H., Hagerstown, Md.
Robertson-Davis Co., 363 W. Superior, Chicago, Ill.
Robertson, Lee F., Inc., 532 West 22nd St., New York.
States Co., 19 New Park Ave., Hartford, Conn.
Stuns & Barron, 210 E. Pratt, Baltimore, Md.
Toledo Standard Commutator Co. 2342 Smead Ave., Toledo, O.
Universal Armature Corp., Cambridge, Mass.
Varley Duplex Magnet Co., 15 Exchange Place, Jersey City, N. J. (Electromagnetic only).
Wheeler Insulated Wire Co., Bridgeport, Conn.

COILS, Honeycomb. See Radio Circuit Components.

COMMUTATOR
Bars. See Bars, Commutator.
Cement. See Cement, Commutator.
Dressers. See Stones, Commutator.
Lubricants. See Compounds, Commutator.
New. See Commutators.
Refilled. See Repairing and Second Hand.
Slotters. See Slotting Machines & Tools, Commutator.
Slotting Files. See Files, Commutator Slotting.
Soldering Machines. See Soldering Machines, Commutator.
Stones. See Stones, Commutator.
Tighteners. See Tighteners, Commutator.
Truing Devices. See Tools, Commutator Truing.

COMMUTATORS
Armature Co., 7500 Stanton Ave., Cleveland, Ohio.
Cameron Electric Mfg. Co., Ansonia, Conn.
Cleveland Commutator Co., 1882 E. 55th, Cleveland, O.
Derby Commutator Co., Derby, Conn.
Electric Materials Co., North East, Pa.
Eureka Metal Products Corp., 501 Clay, North East, Pa.
Homer Commutator Co., 4748 Hough Ave., Cleveland.
Toledo Standard Commutator Co., Toledo, O.

COMMUTATOR BRUSHES. See Brushes, Commutator.
COMPOSITION PULLEYS. See Pulleys, Composition.

COMPOUNDS, Commutator
Allen Co., Inc., L. B., 6752 Bryn Mawr Ave., Chicago, Ill.
Armstrong. See Elec. Power Maintenance.
Chicago Solder Co., 4201 Wrightwood Ave., Chicago, Ill.
Consistency. See Warren Lubricant Co.
Cramolin, Inc., 25 W. 43rd St., New York, N. Y.
Dixon Crucible Co., Jos., Monmouth, Jersey City, N. J.
Doe & Co., Walter S., Kent, Ohio.
Electric Power Maintenance Co., 21 N. Third, Minneapolis
Goldmark Co., James, 83 Warren, New York, N. Y.
Kester Solder Co., 4210 Wrightwood Ave., Chicago, Ill.
Perfection. See Warren Lubricant Co.
Sanderson. See Warren Lubricant Co.
Spermo. See Warren Lubricant Co.
Trotters. See Goldmark Co., James.
Warren Lubricant Co., 22 Maurice, Buffalo, N. Y.

COMPOUNDS, Sealing. See Wax and Compounds.

CONDENSER UNITS, Refrigerator
Bush Mfg. Co., Hartford, Conn.
McCord Radiator & Mfg. Co., Riopelle & E. Grand Ave., Detroit, Mich.
Rome-Turney Radiator Co., Rome, N. Y.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

CONDENSER, Electric
Sevison Magneto Engineering Co., 379 Phillips Ave., Toledo.

CONDENSERS, Radio. See Radio Circuit Components.
CONDENSER TUBING. See Tubing, Brass and Copper

CONNECTORS, Wire
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill. (Solderless-Tapeless).

CONTACT POINTS. See Points, Contact.
CONTAINERS, Shipping. See Fibre Board Products.

CONTROLLERS, Motor
Arlinestor. See Sundh Elec. Co.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Anderson & Co., C. J., 213 W. Austin Ave., Chicago, Ill.
Asco. See Automatic Switch Co.
Automatic Switch Co., 154 Grand, New York, N. Y.
Betts, Inc., James H., 1393 Sedgwick Ave., New York, N. Y. (Traffic.)
Burkau, Inc., 30 Court, Newark, N. J.
Burke Controller Co., 300 Lexington Ave., New York N. Y.
B-Q Oil Burner Co., 324 S. California Ave., Stockton, Cal.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Condit Elec'l Mfg. Corp., 842 Summer (South Boston) Boston, Mass.
Cutler-Hammer Mfg. Co., 1288 St. Paul Ave., Milwaukee.
Diamond Elect. Mfg. Co., 1330 N. 16th, Los Angeles, Cal.
Dinkey. See Elec. Controller & Mfg. Co.
Dunco. See Struthers Dunn, Inc.
E C & M Youngstown. See Electric Controller & Mfg. Co.
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland, O.
Electrite. See Sundh Elec. Co.
Hercules. See Union Elec. Mfg. Co.
General Electric Co., Schenectady, N. Y.
Horni Signal Mfg. Corp., 515 Greenwich, New York.

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379-401 Phillips Ave. Toledo, Ohio

Industrial Controller Div. of Square D Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Maimin Speed Control Corp., 251 W. 19th, New York. (Sewing Machines.)
Monitor Controller Co., 51 Gay, Baltimore, Md.
National Electric Controller Co., 5315 Ravenswood Ave., Chicago, Ill.
Refrigerating Specialties Co., 728 S. Sacramento Blvd. Chicago, Ill.
Resista. See Allen-Bradley Co.
Rowan Controller Co., 306 N. Holliday, Baltimore, Md
Square D Co., Detroit, Mich.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Sundh Elec. Co., 209 Parkhurst, Newark, N. J.
Switcholone. See Condit Elec. Mfg. Co.
Thermaload. See Monitor Controller Co.
Trumbull Electric Mfg. Co., Plainville, Conn.
Ward Leonard Elec. Co., Mt. Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
W. K. See Westinghouse Elec. & Mfg. Co.
Wright. See Electric Controller & Mfg. Co.

COPPER. See Brass, Bronze and Copper; also Castings.
COPPER TUBING. See Tubing, Brass and Copper.
CORD TIPS. See Tips, Cord.
CORD, Tinsel. See Tinsel Cord & Thread.

CORDS, Extension
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.

CORES, RESISTANCE COIL (Lava)
American Lava Corp., 1423 William, Chattanooga, Tenn.
Crescent. See M. Kirchberger & Co.
Ea-El-Co. See Southern Lava Co.
Kirchberger & Co., M., 1425 37th, Brooklyn, N. Y.
Lavite. See Steward Mfg. Co.
Lavarock. See M. Kirchberger & Co.
Southern Lava Co., Rossville, Ga.
Steward Mfg. Co., D. M., Chattanooga, Tenn.
Tennessee Burner Mfg. Co., Chattanooga, Tenn.
XL. See Tennessee Burner Mfg. Co.

CORES, RESISTANCE COIL (Refractory Porcelain)
American Lava Corp., 1423 William, Chattanooga, Tenn.
Colonial Insulator Co., Akron, O.
Cook Pottery Co., Trenton, N. J.
Crowley & Co., Henry L., 1 Central Ave., West Orange, N. J.
Electrical Refractories Co., 50 Clark, East Palestine, O.
Elemite. See Louthan Mfg. Co.
Firelite. See Hartford Faience Co.
Hartford Faience Co., Hartford, Conn.
Louthan Mfg. Co., E. Liverpool, O.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Thermal Syndicate, 58 Schenectady Ave., Brooklyn, N. Y.
Vitrocoil. See Thermal Syndicate.

COTTON DUCK. See Cloth, Untreated.
COTTON SLEEVING. See Tape, Cotton.
COUNTERS, Revolution. See Tachometers.

COUPLINGS, Shaft (Flexible-Insulated)
Ajax Flexible Coupling Co., Westfield, N. Y.
Bartlett Hayward Co., Scott & McHenry, Baltimore, Md.
Bond Co., Charles, 617 Arch, Philadelphia, Pa.
Brown Engineering Co., 123 N. Third, Reading, Pa.
Falk Corp., Milwaukee, Wis.
Delbee Rubber Co., Syracuse, N. Y.
Francke. See Smith & Serrell.
General Electric Co., Schenectady, N. Y.
Grundy. See Bond Co.
Hill Clutch Machine & Foundry Co., 6100 Breakwater Ave., Cleveland, Ohio.
Kanti Lever. See Brown Engineering Co.
Krone-Seebek Die Casting & Mfg. Co., 2935 W. 47th, Chicago, Ill.
Lovejoy Tool Wks., 325 W. Ohio, Chicago, Ill.
LR. See Lovejoy Tool Wks.
Mather. See Bond Co.
Nuttall Wks., of Westinghouse Elec. & Mfg. Co., McCandless Ave. & Harrison St., Pittsburgh, Pa.
Oneida. See Delbee Rubber Co.
Smith & Serrell, 5 Halsey, Newark, N. J.
Webster Mfg. Co., 1854 N. Kostner Ave., Chicago, Ill.
Wood's Sons Co., T. B., Chambersburg, Pa.

COVERING MACHINES, WIRE. See Wire Manufacturing Machines.

COVERS, Paper and Fabric
For Lamp Shades, Paper & Fabric, Fans, Radio & Appliances.
Adjusto. See Phoenix Import Co.
Arkel Safety Bag Co., 10 E. 40th St., New York, N. Y. (For Motors, Fans, Lamp Shades.)
Boyle Co., John, 121 Duane, New York, N. Y. (Fan.)
Droutman Mfg. Co., 36 W. 60th, New York, N. Y.
Empire Shield Co., 590 Broadway, New York, N. Y.
Kennedy Car Liner & Bag Co., Shelbyville, Ind.
Lansing Sales Co., 24 Harvard, Boston, Mass.
La Rose Mfg. Co., 757 Sixth Ave., New York, N. Y. (Rubberized Fan.)
Phoenix Import Co., 45 E. 25th, New York, N. Y. (Shade.)
Superb. See Droutman Mfg. Co.
Superior. See Empire Shield Co.

CRUCIBLES, Porcelain. See Porcelain.
CRANES, Floor. See Lifts, Armature.

CRYSTALS, Chandelier
Crystals, Prisms, Beads, Chains, Fringes.
Crystal Venezia. See Harrison & Co., Arthur.
Foslite. See Harrison & Co., Arthur.
Friedlaender Co., 49 W. 23rd, New York, N. Y.
Harrison & Co., Arthur, 561 W. Washington Blvd., Chicago.
Hirschberg, Shutz & Co., 368 4th Ave., New York, N. Y. (Fringes.)
Nelson Bead Co., 15 W. 37th, New York, N. Y. (Importer.)

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Schwartz Lighting Fixture Wks., 1341 Noble, Philadelphia
Wyle & Bros., J. J., 20 E. 27th, New York, N. Y.

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Gits Bros. Mfg. Co., 1940 S. Kilbourn Ave., Chicago, Ill.
Lunkenheimer Co., Cincinnati, Ohio.

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Gits Bros. Mfg. Co., 1940 S. Kilbourn Ave., Chicago, Ill.
Tucker, Inc., W. W. & C. F., 618 Capital Ave., Hartford, Conn.

CUT OUTS, Battery. See Switches, Battery.
CUTTING OUTFITS, Metal. See Welding and Cutting Outfits.
CURRENT INDICATORS. See Instruments, Pocket.
DASHBOARD METERS. See Instruments, Portable and Switchboard.

DECALCOMANIA
Meyercord Co., Chicago, Ill.
Novar. See Palm Fechteler & Co.
Palm Fechteler & Co., 67 5th Ave., New York, N. Y.

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Radio (Metal). See Radio Mountings.
Radio (Molded). See Radio Molded Parts.
Enameled. See Dials, Enameled.

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Cooper Oven Thermometer Co., Pequabuck, Conn.
DIAPHRAGM, Cloth. See Cloth, Untreated.
DIE CASTINGS. See Castings, Die.

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Madison-Kipp Corp., 211 Waubesa, Madison, Wisc.
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Caldbeck Tool & Mfg. Co., 307 East Third, Des Moines, Iowa.
Chicago Molded Products Co., 2148 Walnut, Chicago, Ill.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
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Madison-Kipp Corp., 211 Waubesa, Madison, Wis.
Mareck & Nebel, 255 Greenwich, New York, N. Y.
Stein & Co., Wm. P., 424 St. Paul, Rochester, N. Y.

DIMMER, Theatre
Ward Leonard Elec. Co., Mt. Vernon, N. Y.

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Steel Discs, Laminations, and Segments for Motors and Transformers.
Alleghany Steel Co., Brackenridge, Pa.
American Stamping Co., 978 E. 64th, Cleveland, O.
Armature Co., 7500 Stanton Ave., Cleveland, O.
Cleveland Armature Works, 4732 St. Clair Ave., Cleveland.
Hercules Elec. Steel Corp., 145 Lafayette, New York, N. Y.
Johnson, H. D., 170 Mahncke Court, San Antonio, Texas
Niagara Machine & Tool Wks., 637 Nortland, Buffalo, N. Y.
Valley Appliances, Inc., 634 Lexington Ave., Rochester N. Y.
Willor Mfg. Corp., 117 Mercer, New York, N. Y.
DRAWING MACHINES, WIRE. See Wire Drawing Mach.
DRIVE SCREWS. See Screws, Drive.
DRIVES, CHAIN. See Chain, Power Transmission.

DYNAMOMETERS
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Diehl Mfg. Co., Elizabeth, N. J.
General Electric Co. Schenectady
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
EBONITE. See Rubber, Hard.
ELECTROLYTE. See Chemicals, Battery.
ELECTROMAGNETS. See Coils, Finished.

ELECTRODES FOR GAS SIGNS
American Neon Sign Corp., 549 W. 132nd St., New York.
American Sign Co., Cincinnati, Ohio.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Q. R. S. De Vry Corp., 333 N. Michigan Ave., Chicago.
ELECTRODYNAMOMETERS. See Instruments, Laboratory Standard.

ELECTRO MAGNETS
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Deckel. See Preis & Co., Inc. H. P.
Eisler Electric Corp., 770 S. 13th, Newark, N. J.
(Tube Base Branders)
Engravograph Corp., 12 Vestry, New York, N. Y.
Etchograph. See Brewster Co., Wm.
Gilbert Supply Co., Independence, Iowa.

Gorton Machine Co., Geo., Racine, Wis.
Luma Elec. Equipment Co., Toledo, O.
Preis & Co., Inc., H. P. 227 Fulton, New York, N. Y.
Schmidt, Inc., Geo. T. 4102 Ravenswood Ave., Chicago, Ill.
Simplex Tool Co., Woonsocket, R. I.

ENGRAVING, Radio Panel
Engraving to Order.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Etch-O-Gravure. See Insuline Corp. of America.
General Fabricating Co., 165 Greenwich, New York, N. Y.
Globe Mfg. Co., 101 Spokane St., Seattle, Wash.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Mechanical Engraving Co., 136 Orchard, Newark, N. J.
Preis & Co., Inc., H. P., 227 Fulton, New York, N. Y.
Schmidt, Inc., Geo. T. 4102 Ravenswood Ave., Chicago, Ill. (Tube Base Branders).
Schwenke Machine Engraving Co., 1096 Woodward Ave., Detroit, Mich.
Verichrome Laboratories, 4614 Spring Grove Ave., Cincinnati
Wright Radio Co., 114 Exchange, Rockland, Mass.
ESCUTCHEONS, Radio. See Radio Mountings.

EYELETS
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
Platt Bros. & Co., Waterbury, Conn.
Waterbury Button Co. (Elecl. Mfg. Dept.), Waterbury, Conn.
FABRIC, Radio Grill. See Cloth, Untreated.
FABRIC SHADES. See Shades, Fabric.
FAN BLADES. See Blades, Fan
FAN GUARDS. See Forms, Wire.

FEET, Felt
Brawley Felt Co., Inc., T. R., 279 20th, Brooklyn, N. Y.
Mattatuck Mfg. Co., Waterbury, Conn.

FELT
American Felt & Cutting Co., 609 W. Lake, Chicago, Ill.
American Felt Co., 315 Fourth Ave., New York, N. Y.
Booth Felt Co., 460 18th, Brooklyn, N. Y.
Brawley Felt Co., Inc., T. R., 279 20th, Brooklyn, N. Y.
Western Felt Wks., 4029 Ogden Ave., Chicago, Ill.

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Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
Chase Brass & Copper Co., Waterbury, Conn.
Clark Metal Products, 490 Hancock Ave., Bridgeport, Conn.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Massachusetts Machine Shop, Inc., Boston, Mass.
Monowatt Elec. Corp., 2 W. 40th, New York, N. Y.
Patton-MacGuyer Co., Providence, R. I.
Platt Bros. & Co., Waterbury, Conn.
Risdon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., 99 Mill, Waterbury, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.
Waterbury Button Co. (Elecl. Mfg. Dept.), Waterbury, Conn.

FIBRE BOARD PRODUCTS (Solid and Corrugated)
Container Corp. of America, 111 W. Washington, Chicago. Chicago, Ill.
FIBER CANDLES. See Candles, Fixture.
FIBRE GEARS. See Gears and Pinions, Composition.
Paper. See Cloth and Paper.
Radio Panels. See Radio Molded Parts.
Shipping Containers. See Fibre Board Products.
Vulcanized. See Fibre, Vulcanized.

FIBRE, Phenol
Moisture Proof; Sheet, Rod, Tubes.
Alco. See American Insulator Corp.
Armite. See Spaulding Fibre Co.
Bakelite-Dilecto. See Continental Fibre Co.
Conite. See Continental-Diamond Fibre Co.
Continental-Diamond Fibre Co., Newark, Del.
Electrical Insulation Corp., 308 W. Washington, Chicago, Ill.
Formica Insulation Co., 4626 Spring Grove Ave., Cincinnati, O.
Franklin Fibre Specialty Co., Wilmington, Del.
Laminated Phenol, Inc., 1228 S. Western Ave., Chicago, Ill.
Micarta. See Westinghouse Elec. & Mfg. Co.
National Vulcanized Fibre Co., Wilmington, Del.
Phenolite See National Vulcanized Fibre Co.
Spaulding Fibre Co., Tonawanda, N. Y.
Synthane Corp., Oaks, Pa.
Textolite. See Electrical Insulation Corp.
Vul-Cot. See National Vulcanized Fibre Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

FIBRE, Vulcanized
Sheet, Rod, Tube, Horn, Fibre, Bushings, Washers, Cleats, Screw Machine Products.
Armite. See Spaulding Fibre Co.
Brandywine Fibre Products Co., 1402 Walnut St., Wilmington, Del.
Conite. See Continental-Diamond Fibre Co.
Continental-Diamond Fibre Co., Newark, Del.
Diamond F. See Continental-Diamond Fibre Co.
Delaware Hard Fibre Co., Box 970M, Wilmington, Del.
Egyptian. See Delaware Hard Fibre Co.
Electrosote. See Pantasote Co.
Fibro Products Co., New Bedford, Mass.
Franklin Fibre Specialty Co., Wilmington, Del.
Fyberoid. See Wilmington Fibre Specialty Co.
Independent Laboratories, 50 E. 42nd, New York, N. Y.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Iten Fibre Co., 5403 Bower Ave., Cleveland, O.
Lincoln Fibre & Specialty Co., Newport, Del.
National Vulcanized Fibre Co., Wilmington, Del.
Ohmold. See Wilmington Fibre Specialty Co.
Pantasote Co., Inc., 250 Park Ave., New York, N. Y.
Peerless. See National Vulcanized Fibre Co.
Spaulding Fibre Co., Tonawanda, N. Y.
Vul-Cot. See National Vulcanized Fibre Co.
Vulcawood. See Continental-Diamond Fibre Co.
Wilmington Fibre Specialty Co., Wilmington, Del.
FIBRE WASHERS. See Fibre.
FIELD COILS. See Coils, Finished.

FILAMENTS, Incandescent Lamp
Cohn, Sigmund, 44 Gold, New York, N. Y.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Filament Supply Co., 1317 Willow Ave., Hoboken, N. J.
Gilby Wire Co., Riverside Ave., Newark, N. J.
National-Harris Wire Co., Newark, N. J.
Newark Radio Laboratories, 50 Columbia, Newark, N. J.
Pierce Mfg. Co., 625 W. Jackson Blvd., Chicago, Ill.
Radio Products Corp., Steneck Trust Bldg., Hoboken, N. J.

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Volkmer Radio Products Corp., 187 Sylvan Ave., Newark, N. J. (Lead-in-Welds.)
Welcon Industries, Inc., Exton Ave. & Buch, North Arlington, N. J. (Lead-in Welds.)

FILES, Commutator Slotting
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Martindale Electric Co., 1262 W. Fourth, Cleveland, O.
FISH PAPER. See Cloth and Paper.
FITTINGS, Fixture. See Fixture Fittings.
FIXTURE CANDLES. See Candles, Fixture.
FIXTURE CHAIN. See Chain, Fixture.
FIXTURE, Collars. See Fixture Fittings.

FIXTURE FITTINGS

	KEY
Bowl Holders	See B
Brass Fittings	See B
Canopies	See B
Collars	See B
Crow Feet	See I
Finials (Brass, Glass and Porcelain)	See B
Hangers	See H
Hickies, Brass	See B
Hickies, Iron	See I
Hooks, Brass	See B
Hooks, Iron	See I
Iron Fittings	See I
Loops, Brass	See B
Loops, Iron	See I
Rings	See B
Shade Holders	See S
Shells	See B
Spinnings	See B
Stampings	See B
Stems	See B
Straps	See H
Studs	See I

Acme Lighting Products, Inc., 2114 Woodland Ave., Cleveland, O. (Straps)						H
American Chain Co., Bridgeport, Conn. (Loops and Rings)		B				
American Ring Co., Waterbury, Conn. (Candle)					S	
Appleton Electric Co., 1703 Wellington Ave., Chicago, Ill.		B	I			
Arco. See American Ring Co.						
Arrow Electric Division of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.					S	
Artoloid. See Great Eastern Brass Wks., Inc.						
Art Metal Co., 3721 Dayton, Cleveland, O.						H
Banlite. See East Side Metal Spinning Co.						
Banner. See Plume & Atwood Mfg. Co.						
Barton Brass Wks., 3627 Superior, Detroit		B				
Belmet. See B. & L. Metal Stamping Co.						
Bloch Bros., 83 Walker, New York		B				
Brandt Mfg. Co., 3727 Gratiot Ave., Detroit		B				
Braun, J. G., 609 S. Paulina, Chicago, Ill. (Pressed Ornaments)		B	I			
Bryant Elec. Co., 1421 State, Bridgeport, Conn.					S	
B. & L. Metal Stamping Co., 250 Moore, Brooklyn, N. Y. (Also Combination Wall Bracket Hanger)		B	I			H
Cambridge Brass Co., Cambridge, Mass.		B				
Chase Brass & Copper Co., Waterbury, Conn.		B			S	
Chatham Metal Spinning & Stamping Corp., 128 Mott, New York, N. Y.		B	I			
Cleaneay. See Dunlap Co.						
Colonial Stamping Co., Brill St. & Passaic Ave., Newark N. J.		B			S	
Crescent Brass Mfg. Co., Spruce & Seventh, Reading, Pa.		B				
Crouse-Hinds, Syracuse, N. Y.					S	H
Diamond Needle & Mfg. Co., Torrington, Conn. (Hickies)			I			
Dunlap Co., John, Hammond & Gregg, Carnegie, Pa.					S	
East Side Metal Spinning Co., 451 Greenwich, New York, N. Y.		B				
Eureka Tin Ware Mfg. Co., 135 W. 20th, New York, N. Y.					S	
E-Z Up. See Plume & Atwood Mfg. Co.						
Faries Mfg. Co., Decatur, Ill.		B	I	S	H	
Fixturelite Mfg. Co., 468 W. Broadway, New York, N. Y.		B				H
Flaherty Co., M. E., 28 S. Clinton, Chicago			I			
Fralick Co., S. R., 15 S. Clinton, Chicago			I			
Franklin Brass Foundry Co., Reading, Pa.		B				
Friedley-Voshardt Co., Chicago		B				
Grabler Mfg. Co., 6565 Broadway, S. E., Cleveland, O.			I			
Great Eastern Brass Wks., Inc., 182 Grand, New York, N. Y. (Composition Spindles)						
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.					S	
Iliffy. See White Mfg. Co., J. H.						
Kwikon. See Fralick Co., S. R.						
Lakin. See Thomas & Betts Co.						
Liberty Brass Turning Co., 88 Walker, New York, N. Y.			I			
Liberty Iron Pipe & Nipple Works, 62 Greene, New York, N. Y.		B	I			
Liberty Machine Co., Wauwatosa, Wis.		B	I			
L & K Mfg. Co., 440 Adelphi, Brooklyn, N. Y.						H
L. & W. Brass Wks., 361 W. Superior, Chicago		B				
Madelite. See Belson Mfg. Co.						
M S W Mfg. Co., 1527 Niagara Ave., Buffalo, N. Y.			I			
Meisun Mfg. Co., 144 E. Morris, Indianapolis, Ind.		B				
Meta. Products Co., 210 Canal, New York		B				
Metro Iron Ornament Co., 191 Christie, New York, N. Y.			I			
Metropolitan-Columbia Mfg. Co., 714 Metropolitan Ave., Brooklyn, N. Y.		B				
Midwest Elec. Co., 1639 Walnut, Chicago, Ill.			I			
Mid-West Chandelier Co., 14th & Chestnut Sts., Kansas City, Mo.		B				

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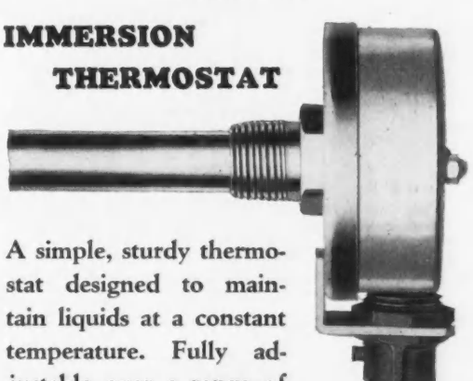

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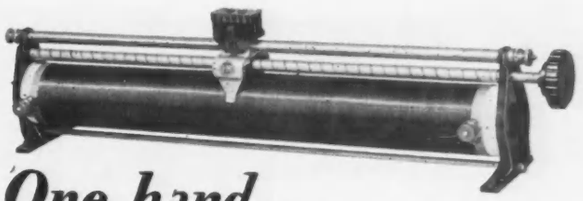
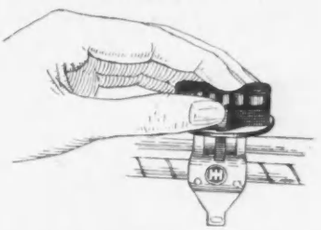
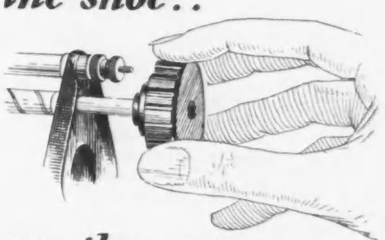
THE WILCOLATOR CO.
Newark New Jersey



One hand . .



slides the shoe . .



turns the screw . .

in this Newer, Better RHEOSTAT

GRASPING the slider knob with *one hand* automatically disengages the screw selector mechanism, for rapid adjustment of the new HH Tubular Rheostat. Release of grasp restores the screw engagement as soon as the screw knob is turned—and again *one hand* quickly selects the desired turn.

Every part of this improved rheostat is built for long service. The phosphor bronze contact shoe is rugged but smooth in action. It will not tear the wire. A radically new contact system separates the contacting function from the pressure applying function. The current does not pass through the pressure springs. They cannot lose their resiliency through overheating.

Here is a logical application of sound engineering principles to rheostat design. Your request will bring full details on types, capacities and prices. Have us send you this information.

TUBULAR HH RHEOSTATS

HARDWICK, HINDLE, INC.
216 Emmet St., Newark, N. J.

FIXTURE FITTINGS—Continued.

Monarch. See Perfeclite Co.
Murlin Mfg. Co., 5420 Paschall Ave., Philadelphia, Pa. ..... B I . . . .
National Elec. Products Corp., Inca Mfg. Div., Fort Wayne Ind. (Studs.) ..... I . . . .
New Era Elec. Mfg. Co., 6725 Machinery Ave., N. E., Cleveland, O. ..... H
New Wrinkle. See Bryant Elec. Co.
New York Brass Turning Co., 568 Broadway, New York, N. Y. ..... B . . . . .
Noboit. See Fralick & Co., S. R.
N. W. Clesi Receptacle Bracket, 2437 N. 29th, Philadelphia, Pa. ..... I . . . .
Onli. See Perfecelite Co.
Pass & Seymour, Div. H. Solvay Sta., Syracuse, N. Y. ..... B . . S . .
Perfecilte Co., 1457 E. 40th, Cleveland. ..... S . .
Pittsburgh Valve & Fittings Co., Barberton, O. .. I . . .
Plume & Atwood Mfg. Co., Waterbury, Conn. B . . S H
Plumwood. See Plume & Atwood Mfg. Co.
Plymouth. See Vester Sons, Alfred.
Products Machine Co., Bridgeport, Conn. ..... B . . . . .
Reading Brass Co., 141 Schiller, Reading, Pa. B I . . . .
Ribaysen Mfg. Co., J., 952 W. Lake, Chicago, Ill. B . . . . .
Rodale Mfg. Co., Emaus, Pa. ..... B . . . . .
Scovill Mfg. Co., Waterbury, Conn. ..... S I . . . .
Simpalite. See Sprecher Mfg. Co., P. W.
Simplex. See Plume & Atwood Mfg. Co.
Springfast. See Plume & Atwood Mfg. Co.
Square-Gee. See Grabler Mfg. Co.
Standard Snap-Lite Corp., 504 Jackson Ave., Long Island City, N. Y. ..... S . .
Standard Metal Spinning Co., 128 Mott, New York, N. Y. ..... B . . . . .
Star. See Perfecilte Co.
Star. See Steel City Elec. Co.
Steel City Elec. Co., 1207 Columbus Ave., Pittsburgh, Pa. ..... I . . . .
Steele & Johnson Mfg. Co., Waterbury, Conn. B . . S . .
Stembridge & Brandt, 29 S. Clinton, Chicago, Ill. (White Metal.) ..... B . . . . .
Sterling Spinning & Stamping Wks., 476 Broome, New York, N. Y.
T. & B. See Thomas & Betts Co.
Thomas & Betts Co., 15 Park Pl., New York. . . I . . . .
Uno. See Bryant Elec. Co., also Crouse-Hinds, also General Elec. Co., also Hart & Hegeman Mfg. Co., also Pass & Seymour.
United. See L & K Mfg. Co.
United Metal Spinning Co., 440 Adelphi, Brooklyn, N. Y. ..... B . . . . .
Universal Brass Wks., 209 Vine, Philadelphia. B . . . . .
Vester, Sons, Alfred, 5 Mason, Providence, R. I. B . . . .
Victor. See Plume & Atwood Mfg. Co.
Virden, Div. of Gill-Virden Co., 6108 Longfellow Ave., Cleveland, O. ..... B . . . . .
Walden Tool & Metal Mfg. Co., 3 Oxford, New Haven, Conn. ..... .
Wameco. See Waterbury Metal Wares Co.
Waterbury Metal Wares Co., Waterbury, Conn. . . . S . .
Weber Brass Co., Whitney Power Block, Cleveland, O. ..... B . . . . .
White Diamond. See White Mfg. Co., J. H.
White Mfg. Co., J. H., 79 Madison Ave., New York, N. Y. ..... B . . S . .
Wilhite Machine Wks., 1345 S. Hope, Los Angeles, Cal. ..... B . . . .

FLASHERS, Sign

Motor Flashers, Thermal Flashers, Flashing Sockets and Plugs.

Ajax. See Reynolds Spring Co.
A. & W. See General Outdoor Adv. Co.
Angelus. See Electric Sign Flasher Corp.
Betts, Inc., James H., 1393 Sedgwick Ave., New York. (Motor Flashers, Thermal Flashers, Flashing Sockets and Plugs.)
Betts & Betts Corp., 545 W. 43rd, New York, N. Y. (Motor Flashers.) (Thermal Flashers.) Flashing Plugs.)
California Sign Flasher Co., 230 Guttenberg, San Francisco
Commercial Elec. Co., 1203 E. Grant, Portland, Ore.
Consolidated Elec. Sign Corp., Opalume Div., 99 West Main, Battle Creek, Mich.
Diamond. See General Appliance Corp.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Electric Signal Corp., 406 Fourth Ave., Seattle, Wash.
Electric Sign Flasher Corp., 1826 W. 9th, Los Angeles, Cal.
Figuregram. See Reynolds Electric Co.
Flash O-Lite. See Betts, Inc., James H.
Flip-Flop. See Betts, Inc., James H.
Gem Engineering Co., Hempstead, N. Y.
Gacor. See General Appliance Corp.
General Appliance Corp., 120 8th, San Francisco, Cal. (Flasher Button.)
General Kontrolar Co., 200 E. First, Dayton, O.
Harrington-Seaberg Corp., 1708 Third Ave., Moline, Ill.
Horni Signal Mfg. Co., 516 Greenwich, New York, N. Y.
Hotchkiss. See Time-O-State Controls Co.
Jimbetts. See Betts, Inc James H
Kontrolar. See General Kontrolar Co. & Leland Elec. Co.
Leland Electric Co., Dayton, O.
Mercury. See Betts, Inc., James H.
Phelps Elec. Co., 29 S. Clinton, Chicago, Ill. (Motorless)
Phoenix Products Co., Phoenix, N. Y.
Presto Products Co., 520 Broadway, New York, N. Y. (Sockets and Plugs.)
Reco. See Reynolds Elec Co
Reynolds Elec. Co., 2622 W. Congress, Chicago, Ill.
Reynolds Spring Co., Jackson, Mich.
Rodale Mfg. Co., Emaus, Pa.
Ryan. See Phoenix Products Co.
Skedoodle. See Phelps Elec. Co.
Sokit. See Betts, Inc., James H.
Therm-Wynk. See Betts & Betts Corp.
Time-O-State Controls Co., Elkhart, Ind.
Vacu. See Betts & Betts Corp.
Veebar. See Betts, Inc., James H.
Way, Eugene W., Seattle, Wash.
Wood Electric Co., C. D., 565 Broadway, New York N. Y.
Woodwin. See Wood Elec. Co., C. D.
Wynk-A-Lyte. See Betts & Betts Corp.

FLASHLIGHT LENSES. See Lenses.
FLEXIBLE ARMS. See Tubing, Flexible Metallic.
FLEXIBLE LEADS, Commutator Brush. See Brushes, Commutator.

FLEXIBLE SHAFTING

Binghamton Flexible Shaft Co., 239 Water, Binghamton, N. Y.
Chicago Flexible Shaft Co., 5600 W. Roosevelt Rd., Chicago, Ill.
Haskins Co., R. G., 4656 W. Fulton, Chicago, Ill.
Stow Mfg. Co., 443 State, Binghamton, N. Y.
Strand & Co., M. A., 5001 N. Lincoln, Chicago, Ill.

FOIL, Tin. See Tin Foil.

FORGINGS, Non-Ferrous

Rome Mfg. Co. (Div. of Revere Copper & Brass, Inc.), Rome, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

FORMS, Coil Winding

Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, O.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Master. See Armature Coil Equipment Co.

FORMS, Wire

Forms and Frames for Shade Holders and Shades: Bending, Welding, Forming.
American Specialty Mfg. Co., 165 Holland Ave., Bridgeport, Conn.
Arrow Wire Frame Corp., 206 E. 27th, New York, N. Y.
Blake & Johnson Co., 1497 Thomaston Ave. (Waterville), Waterbury, Conn.
Central Wire Frame Co., 154 E. 23rd, New York, N. Y. (Complete with socket, cord and plug.)
Chelsea Wire Wks., 675 Hudson, New York, N. Y.
Clark Metal Products Inc., 490 Hancock Ave., Bridgeport, Conn.
City Wire Frame Co., 2025 S. Michigan Ave., Chicago.
Electro Weld Co., 70 Munroe, Lynn, Mass.
Fischer Spring Co., Chas., 253 Kent Ave., Brooklyn, N. Y.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Hubbard Spring Co., M. D., Pontiac, Mich.
Hunson Mfg. Co., Forestville, Conn.
Hunter Pressed Steel Co., Lansdale, Pa.
Idealite Lamp Shade Mfg. Co., 49-55 Fremont, Jersey City, N. J.
Jenkinson & Co., R. C., 293 Washington, Newark, N. J.
Jeschke Wire Specialty Wks., Crawfordsville, Ind.
Krischer's Mfg. Co., 255 Calyer, Brooklyn, N. Y.
Manhattan Wire Products Co., 328 First Ave., New York.
Mattatuck Mfg. Co., Waterbury, Conn.
Murray Hill Wire Frame Co., 314 E. 32nd, New York. N. Y.
No-Draft Fan Fixture Co., 1703 Builder Bldg., Chicago, Ill. (Fan Guard.)
Protectafan Co., 5152 Delmar Blvd., St. Louis, Mo. (Fan Guard.)
Roebling's Sons Co., John A., Trenton, N. J
Russell Mfg. Co., John M., Naugatuck, Conn.
Steinen & Co., 297 Washington, Newark, N. J.
Watral & Sons, 133 E. 16th, New York, N. Y.
Young Industries, Inc., L. A., Detroit, Mich.

FRAMES, Wire. See Forms, Wire.
FRICTION TAPE. See Tape, Rubber and Friction.
FRINGE, Chandelier. See Crystals, Chandelier.

FUSE CLIPS

Roach-Appleton Mfg. Co., 3440 N. Kimball Ave., Chicago.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Waterbury Brass Goods Co., Waterbury, Conn.

FUSE PLUG SCREW SHELLS. See Shells, Screw Socket.
FUSE TESTERS. See Testers, Fuse and Circuit.

FUSES AND FUSE WIRE

KEY

Cartridge ..... See C
Plug ..... See P
Non-Refillable ..... See N
Refillable ..... See R
Open Link ..... See O
Fuse Wire ..... See O

Acme Elec. & Mfg. Co., Canal & Hamilton Ave., Trenton, N. J. ..... P . . . . .
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh, Pa. ..... O
Arklees. See Economy Fuse Mfg. Co.
Automatic Elec. Iron & Fuse Co., 215 S. American, Philadelphia, Pa. ..... P . . . . .
Bryant Elec. Co., 1421 State, Bridgeport, Conn.
Bussmann Mfg. Co., University & Jefferson Ave., St. Louis ..... C P N R O
Chase-Shawmut Co., Newburyport, Mass.. C P N R O
Clearmite. See Economy Fuse & Mfg. Co.
Clear-Top. See Trico Fuse Mfg. Co.
Colortop. See Trico Fuse Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. (Automobile) ..... C . . N R . .
Commercial Enclosed Fuse Co., 1317 Willow Ave., Hoboken, N. J. ..... C P N . . .
Cote Bros. Mfg. Co., 182 W. Lake, Chicago C P . . R . .
Crystal. See Royal Elec. Co.
Daum Fuse & Elec. Mfg. Co., 1157 Hedgkiss, Pittsburgh ..... C . . . R . .
D. & W. See Graybar Electric Co.
Eagle Electric Mfg. Co., Inc., 49 Hall, Brooklyn, N. Y. ..... P . . . . .
Economy Fuse & Mfg. Co., 2717 Greenview Ave., Chicago, Ill. ..... C P N R . .
Electric Fuseguard Co., Charlottesville, Va.. C P N R . .
Elliott Electric Co., Shreveport, La. ..... .
Gem. See Jefferson Elec. Co.
General Elec. Co., Section W-329 (Merchandise Dept.), Bridgeport, Conn. ..... C P N R . .
Graybar Electric Co., New York, N. Y. ..... C . . . . .
Great Western Fuse Co., 1510 Chrysler Bldg., New York, N. Y. ..... R . .
H. & H. See Hart & Hegeman.
Hudson Wire Co., Ossining, N. Y. ..... O
Jefferson Electric Co., 1500 S. Laflen, Chicago, Ill. ..... C P N R O
Kentark. See Trico Fuse Mfg. Co.
Kirkman Engrg. Co., 1 Dominick St., New York, N. Y. ..... C P N . . O
Monarch Fuse Co., 116 E. First, Jamestown, N. Y. ..... C . . N R . .
National. See Economy Fuse & Mfg. Co.
Neark. See Colt's Patent Fire Arms Mfg. Co.
Pierce Renewable Fuses, Inc., 77 E. Swan, Buffalo, N. Y. ..... C P . . R . .
Platt Bros. & Co., Waterbury, Conn. ..... O
Powell, F. W., 119 W. Ohio, Pittsburgh. . . P . . R . .
Pyrotite. See Bryant Electric Co.
Ree-Nu-It Elec. Co., New Bedford, Mass.. C P . . R . .
Rochester Re-Fill Fuse Co., 402 Cutlage, Rochester, N. Y. ..... C . . . R . .
Royal Elec. Co., Chelsea Station, Boston. . . . P N . . . .
Saco. See U. S. Electric Co.
Shawmut. See Chase-Shawmut Co.
Simplex. See Powell, F. W.
Six-In-One. See Industrial Engrg. Co.
Star Fuse Co., 235 Canal, New York, N. Y. C P . . R . .
Trico Fuse Mfg. Co., 1001 McKinley Ave., Milwaukee ..... C P N R . .
Union. See Jefferson Elec. Co.
U.S. Electric Co., 18 Chambers, Trenton, N.J. . . P . . . . .

GALVANIZING

Cattle & Bros., Joseph P., Gaul and Letterly Sts., Philadelphia, Pa.
GALVANOMETERS. See Instruments, Laboratory Standard.

GAS, Inert

Helium Co., Louisville, Ky.
Palatine Industrial Co., 111 Fifth Ave., New York, N. Y.
Weber, Alfred, 5 Union Square, New York, N. Y.

GAS SIGN ELECTRODES. See Electrodes for Gas Signs.

GASKETS,

See also Washers, Non Metallic; Fiber.
Bosley Co., D. W., 906 Marquette Bldg., Chicago, Ill.

Gutta Percha & Rubber Mfg. Co., 15 Park Row, New York.
Canfield Rubber Co., Bridgeport, Conn.
Wrigley Bros., 356 W. 18th, New York, N. Y.

GAUZE BRUSHES, Wire. See Brushes, Commutator
GEARS, Fibre. See Gears and Pinions, Composition.

GEARS (Speed Changing Units)

Albro-Clem Elevator Co. and Atlantic Elevator Co., 501 E. Erie Ave., Philadelphia, Pa.
Chicago Gear Works, 769 W. Jackson Blvd., Chicago, Ill.
Cleveland Worm & Gear Co., Cleveland, Ohio.
Culiman Wheel Co., 1346 Altgeld, Chicago, Ill.
De Laval Steam Turbine Co., N. Clinton Ave., Trenton, N. J.
Falk Corp., Milwaukee, Wis.
Farrell-Birmingham Co., 344 Vulcan, Buffalo, N. Y.
Foote Bros. Gear & Machine Co., 215 N. Curtis, Chicago, Ill.
Gears & Forgings, Inc., Cleveland, Ohio.
Grant Gear Works, Boston, Mass.
Horsburgh & Scott Co., Cleveland, O.
James Mfg. Co., D. O., 114 W. Monroe, Chicago, Ill.
Jones Fdy. & Machine Co., W. A., 16 N. Jefferson, Chicago.
Lewellen Mfg. Co., Columbus, Ind.
Nuttall Wks., of Westinghouse Elec. & Mfg. Co., McCandless Ave. & Harrison St., Pittsburgh, Pa.
Morrison Machine Co., Paterson, N. J.
Pelmer-Bee Co., 1750 Poland Ave., Detroit, Mich.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Philadelphia Gear Works, Richmond and Tioga Sts., Philadelphia, Pa.
Smith, Winfield H., Springville, N. Y.

GEARS, Worm

Albaugh-Dover Mfg. Co., 2100 Marshall Blvd., Chicago, Ill.
Chicago Gear Works, 769 W. Jackson Blvd., Chicago, Ill
Cleveland Worm & Gear Co., Cleveland, Ohio.
Colburn Gear & Mfg. Co. (Norfolk Downs), Quincy, Mass.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Philadelphia Gear Works, Richmond and Tioga Sts., Philadelphia, Pa.

GEARS AND PINIONS, Composition

Continental Diamond Fibre Co., Bridgeport, Conn.
Delaware Hard Fibre Co., Box 470M Wilmington, Del.
Fabroil. See General Elec. Co.
Foote Bros. Gear & Machine Co., 215 N. Curtis, Chicago.
Franklin Fibre Specialty Co., Wilmington, Del.
General Electric Co., Schenectady, N. Y.
Medart Co., St. Louis, Mo.
Micarta. See Westinghouse Elec. & Mfg. Co.
National Vulcanized Fibre Co., Wilmington, Del.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Stahl Gear & Machine Co., 1390 E. 40th, Cleveland, Ohio
Stranahan Gear Co., Frederick & Valletee, Philadelphia, Pa.
Textoil. See General Electric Co.
Textolite. See General Electric Co.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa

GEARS AND PINIONS, Iron and Steel

Chicago Gear Wks., 769 W. Jackson Blvd., Chicago, Ill.
Earle Gear & Machine Co., Wayne Junction, Philadelphia.
Falk Corp., Milwaukee, Wis.
Gears & Forgings, Inc., Cleveland, Ohio.
Grant Gear Works, Boston, Mass.
James Mfg. Co., D. O., 114 W. Monroe, Chicago, Ill.
Medart Co., St. Louis, Mo.
Meisel Press Mfg. Co., 944 Dorchester Ave., Boston, Mass.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Permag. See Perkins Machine.
Tool Steel Gear & Pinion Co., Cincinnati, Ohio.

GEARS AND PINIONS, Rawhide

Chicago Gear Works, 769 W. Jackson Blvd., Chicago, Ill.
Chicago Rawhide Mfg. Co., 1237 Elston Ave., Chicago, Ill.
Gerdes & Co., 30 Church, New York, N. Y.
Syracuse Rawhide Mfg. Co., Syracuse, N. Y.
Western Rawhide & Belting Co., Milwaukee, Wis

GENERATORS, Electroplating. See Plating Generators.
GLASS BULBS. See Bulbs, Glass.
GLASS CANDLES. See Candles, Fixture.
GLASS LETTERS. See Letters, Sign.

GLASS for Electrical Purposes

Canton Glass Co., Marion, Ind.
Corning Glass Wks., Corning, N. Y.
Pyrex. See Corning Glass Wks.

GLASSWARE

Bayley & Sons, 105 Vanderveer, Brooklyn, N. Y. "Equalite."
Beaumont Co., Morgantown, W. Va.
Bienenfeld Glass Wks., Inc., 1539 Covert, Brooklyn, N. Y.
Bostock Rhoades & Co., 11 N. Moore, New York, N. Y.
Chesler & Sons, J., 41 Varick Ave., Brooklyn, N. Y.
Consolidated Lamp & Glass Co., Coraopolis, Pa. "Amelite," "Aurora," "Cora-Lite," "Martele," "Nulite," "Pastelle," "Rosedora," "Shade-O-Tone."
Corning Glass Co., Corning, N. Y. "Aurene," "Calcite."
Eagle Mfg. Co., Wellsburg, W. Va.
Erskine Glass & Mfg. Co., Wellsburg, W. Va.
Forger & Co., A. H., 2414 E. 58th, Los Angeles, Cal.
Gill Glass & Fixture Co., Amber & Venango, Philadelphia, Pa. "Allglass," "Gillglo," "Gillway," "Hyperion," "Nova," "Una," "Utilitilite," "Velva."
broidro," "Celatone," "N.B.G.," "Nugloss," "Nebulite," "Nemalite."
Gillinder Bros., Inc., Port Jervis, N. Y. "Astron," "Cosmic," "Orion," "Opolo," "Pearltone."
Gleason-Tiebout Glass Co., 99 Commercial, Brooklyn, N. Y. "Alabaster," "Amazon," "Blanco," "Carmia," "Carrara," "Celestalite," "Florentine," "Gletian," "Gletieco," "Opalux," "Polycase," "Silverglow."
Holophane Co., 342 Madison Ave., New York, N. Y.
Imperial Glass Co., Bellaire, O. "Nuart."
Inland Glass Wks., Inc., 6101 W. 65th, Chicago, Ill. "Snow White," "Inlite," "Alabaster," "Cased," "Crackled," "Etched."
Ivanhoe Division of Miller Co., Meriden, Conn. "Clearcut," "Druid," "Gemco," "Ivre," "Regent," "Regello," "Sudan," "Trojan," "Voloria," "Yural."
Jeannette Shade & Novelty Co., Jeannette, Pa. "Ardmore," "Tensolite."
Jefferson Glass Co., Follansbee, W. Va. "Moonstone," "Nitro-Glass."
Kopp Glass, Inc., 2210 Palmer, Swissvale, Pa. "Havana," "Nico," "Delica White."
Lamp & Glass Specialty Co., Monaca, Pa.
Macbeth-Evans Glass Co., Charleroi, Pa. "Albe," "Cremax," "Monax," "Thebian," "Lumite," "Galax."
McFaddin & Co., H. G., 38 Warren, New York, N. Y. "Bellova," "Emeralite."
Perfection Glass Co., Star City, W. Va. "Opiex."
Phoenix Glass Co., Monaca, Pa. "Ivory," "Magnolia," "Radiant."
Plaut & Co., L., 432 E. 23rd, New York, N. Y. "Beryllite."

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FOR many applications such as signal systems, bank and burglar alarms or as a source of power for any apparatus within its power range.

Voltages:
6—12—18—24—32
B. H. P. .01—.015
Weight, 21 oz.
Ball Bearing
D. C. only

Write for literature describing other types of K-D Low Voltage Motors.

Kendrick & Davis Company

Lebanon, N. H.

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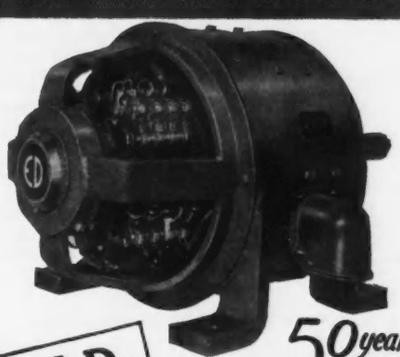

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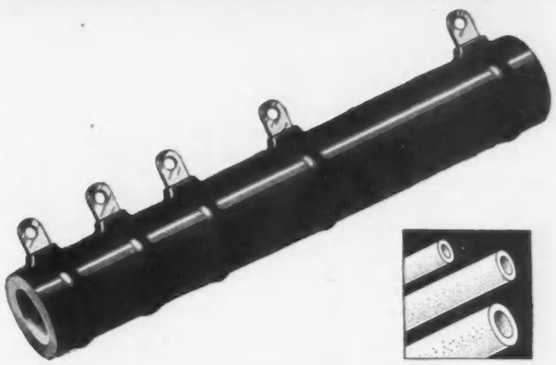
Its structure is electro-welded rolled steel stock. For this reason it is lighter and stronger than any motor of cast-iron construction.

The WELD-BUILT MOTOR is interpole and ball bearing equipped.

Let us send you Bulletin No. 262, illustrating and describing this motor

ELECTRO DYNAMIC CO.
BAYONNE, N. J.

VITROHM (WL) RESISTORS



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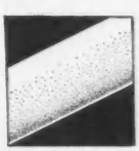

They are uniform in texture to bond better with the enamel

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Each order we receive is, in some respect, unique in application or duty so, *to us*, resistor design represents a many-sided problem.

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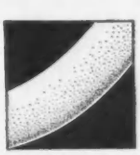

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Mount Vernon, New York

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Portable, Direct reading

Interchangeable Thermocouples for instantly testing surface temperatures of solids, furnace temperatures and temperatures of molten metals. An accurate, sturdy, convenient instrument at an extremely low price. Write today for descriptive circular.

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Steimer, Doran & Rowe, 336 Fourth Ave., Pittsburgh, Pa.
"Radax."
Wells Glass Co., Kokomo, Ind. "Daylite."
Williamsburg Flint Glass Co., 290 Broadway, New York.
Zanesville Mould Co., Zanesville, O.

GONGS, Unmounted Shells

Bevin Bros. Mfg. Co., East Hampton, Conn.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
East Hampton Bell Co., East Hampton, Conn.
Gong Bell Mfg. Co., East Hampton, Conn.
Hill Brass Co., M. N., East Hampton, Conn.
Liberty Bell Mfg. Co., Minerva, O.
Reiter, G. C., Canton, O.

GRAPHITE BEARINGS. See Bearings, Oil-less.
GREASE CUPS. See Cups, Grease.
GRID LEAKS. See Radio Circuit Components.
GRIDS, Resistance. See Units, Rods and Grids.
GRILL CLOTH. See Cloth, Untreated.
GRINDERS, Commutator. See Tools, Commutator Truing.
GROMMETS. See Eyelets.
GROUND LOCATORS. See Instruments, Portable and Switchboard; also Testers, Coil.
GROWLERS, Armature. See Testers, Coil.
GUARDS, FAN. See Forms, Wire.

HANDLES, Wood; For Switches or Sad Irons

Allen, Chas. E., Pequabuck, Conn.
American Ename' Co., 20 Neville, Providence, R. I.
Bogert & Hopper, 225 Varick, New York, N. Y.
Estes & Son, E. B., 5844 Grand Central Terminal Bldg. New York, N. Y.
Fitchburg Enamel Co., Fitchburg, Mass.
Flanders Hardware Co., North Weare, N. H.
Fuller, J. J. Westfield, Mass.
Narragansett Mach. Co., Pawtucket, R. I.
National Wood Process, New Bedford, Mass.
Novelty Turning Co., Norway, Me.
Ober Mfg. Co., Chagrin Falls, O.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Piqua Handle & Mfg. Co., Piqua, Ohio.
Royal Enamel Co., Fitchburg, Mass.
Schutz Bros., 152 Chambers, New York, N. Y.
Stiles & Co., H. A., 174 Portland, Boston, Mass.
Stratton Mfg. Co., Stratton, Maine.
Strombeck-Becker Mfg. Co., Moline, Ill.
Sun Enamel Wks., Leominster, Mass.

HEATERS, Industrial

Beckwith Machine Co., 402 Chestnut, Ravenna, O.
Hold-Heet. See Russell Electric Co.
Russell Electric Co., 384 W. Huron, Chicago, Ill.
Sta-Warm. See Beckwith Machine Co.

HOLDERS, Brush. See Brushes, Commutator
HONEYCOMB COILS. See Radio Circuit Components.
HOT WIRE METERS. See Instruments, Portable and Switchboard.
IMPREGNATING COMPOUNDS. See Wax and Compounds
IMPREGNATING, VACUUM. See Ovens, Industrial.
INCANDESCENT LAMP BULBS (Unfinished). See Bulbs Glass.
INCANDESCENT LAMP FILAMENTS. See Filaments Incandescent Lamp.

INDICATORS, Operation

Operation and Cost Indicators for Manager's Office.
Bristol Co., Waterbury, Conn. (Elapsed Time Recorder.)
Electric Indicator Corp., Stamford, Conn.
Elinco. See Electric Indicator Corp.

INDUCTION COILS. See Coils, Finished.
INSTRUMENT, Jewels. See Jewels.
INSTRUMENTS, Laboratory Standard. See Instruments, Laboratory Standard.
INSTRUMENTS, Portable Testing. See Instruments, Portable and Switchboard: also Instruments, Pocket.

INSTRUMENTS, Laboratory Standard

Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Beck Bros., 421 Sedgley Ave., Philadelphia, Pa.
Biddle, James G., 1209 Arch, Philadelphia, Pa.
Burt, R. C., 347 Michigan Ave., Pasadena, Cal. (Oscilloscopes.)
Cambridge Instrument Co., Grand Central Terminal Bldg., New York, N. Y.
Chicago Apparatus Co., 1735 N. Ashland Ave., Chicago, Ill.
Delta-Star Elec. Co., 2437 Fulton, Chicago, Ill.
Eppley Laboratory, Newport, R. I. (Standard Cells.)
Fahy. See Rubicon Co.
General Electric Co., Schenectady, N. Y.
Gray Instrument Co., 64½ W. Johnson, Philadelphia, Pa
Hickok Elec'l Instrument Co., 10514 Dupont, Cleveland, O.
Jagabi. See Biddle, James G.
Jewell Elec'l Instrument Co., 1650 Walnut, Chicago, Ill.
Kasson. See Rawson Elec'l. Instrument Co.
Kelvin. See Leeds & Northrup Co
Konirausch. See Leeds & Northrup Co.

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Insulation Testing Instruments
JAGABI Hand Tachometers
FRAHM Frequency Meters
JAMES G. BIDDLE
1209-11 Arch St., Philadelphia
THE "MEG"

Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa
Milvay. See Chicago Apparatus Co.
Osiso. See Westinghouse Electric & Mfg. Co.
Rawson Eleg'l Instrument Co., Cambridge, Mass.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Rubicon Co., 29 N. Sixth, Philadelphia Pa. (Wheatstone Bridges, Galvanometers, Inductance Condensers, Potentiometers, Resistance Boxes, Permeameters.)
Shallcross Mfg. Co., Collingdale, Pa.
Simplex. See Leeds & Northrup Co.
Strobatchy. See Argco Laboratories, Inc.
Stromberg Electric Co., 223 W. Erie, Chicago, Ill.
Thompson-Levering Co., 351 N. 57th St., Philadelphia, Pa
Unipivot. See Rawson Elec'l Inst. Co.
Vreeland Apparatus Co., 140 Cedar, New York, N. Y
(Sine Wave Oscillators.)
Westinghouse Electric & Mfg. Co., Newark, N. J.
Weston Elecl. Instrument Corp., 582 Freilinghuysen Ave., Newark, N. J.

INSTRUMENTS, Pocket

Beyer Products Co., 197 Grove, Bloomfield, N. J.
Ideal Instrument Co., Penacook, N. H.
Jewell Elec. Instrument Co., 1650 Walnut, Chicago, Ill.
Kellogg Switchboard & Supply Co., 1066 W. Adams, Chicago, Ill.
Lundquist Tool & Mfg. Co., Worcester, Mass.
Readrite Meter Works, 7 College Ave., Bluffton, Ohio.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Shire Elec. Products Co., Marquette Bldg., Detroit, Mich.
Sholder-Excel Mfg. Co., Clyde, Ohio.
Square D Company, Detroit, Mich.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio.
Weston Elecl. Instrument Corp., 582 Freilinghuysen Ave., Newark, N. J.
Wigginton. See Square D Company.
Yankee. See Lundquist Tool Mfg. Co.

INSTRUMENTS, Portable and Switchboard

This heading includes all standard, portable and switch board types, measuring and testing instruments—ammeters, voltmeters, wattmeters, ohmmeters, cable testers and fault-finders.
See Also Instruments, Pocket; Also Instruments, Laboratory Standard.

Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Beck Bros., 421 Sedgley Ave., Philadelphia, Pa.
Beede Instrument Co., Penacook, N. H.
Biddle, James G., 1209 Arch, Philadelphia, Pa.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Wayne and Windrim Sts., Philadelphia, Pa.
Cambridge Instrument Co., Grand Central Terminal, New York, N. Y.
Century Elecl. Co., 100 Randall Ave., Syracuse, N. Y.
Donegan Electric Mfg. Co., 2985 Franklin, Detroit, Mich.
Eastern Specialty Co., 4551 N. Fifth, Philadelphia, Pa
Edison Lamps Works of G. E. Co., (Nela Park) Cleveland, O.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O.
(Radio Condenser Test Set.)
Electric Mfg. Co., 966 Mission, San Francisco, Cal.
Esterline-Angus Co., Speedway, Indianapolis, Ind.
Etna Elec. Wks., 410 E. 15th, New York, N. Y.
Fidelity Electric Co., Lancaster, Pa.
Fisher. See Leeds & Northrup.
Fore Elecl. Mfg. Co., 5255 Wabash Ave., St. Louis, Mo
Freyn Engrg. Co., 310 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
General Radio Co., 30 State, Cambridge, Mass.
Gray Instrument Co., 64½ W. Johnson, Philadelphia, Pa.
Ground-Ohmer. See Sticht & Co.
Handy. See Weinberg & Co.
Beyer Products Co., 197 Grove, Bloomfield, N. J.
Hickok Elecl. Inst. Co., 10514 Dupont, Cleveland, O.
Hoyt Elecl. Inst. Wks., 857 Boylston, Boston, Mass.
I T L. See Illinois Testing Laboratories.
Jewell Elec'l Instrument Co., 1650 Walnut, Chicago, Ill.
King. See Electric Heat Control Co.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa
Master. See Jewell Elecl. Instrument Co.
M D C. See Metropolitan Devices Corp.
Megger. See Biddle.
Metropolitan Devices Corp., 1250 Atlantic Ave., Brooklyn
Multi-Volt Trouble Finder. See Welford, Jr., Geo. W
Norton Elecl. Inst. Co., 81 Hilliard, Manchester, Conn.
Paneltest Meters. See Beede Instrument Co.
Paragon Megohmer. See Sticht & Co., H. H.
Peerless Meters. See Thompson-Levering Co.
Pier Equipment Mfg. Co., Benton Harbor, Mich.
Pin-Jack. See Weston Elec'l Instrument Co.
Price Hollister Co., Rockford, Ill.
Queen. See Gray Instrument Co.
Rawson Elecl. Inst. Co., Cambridge, Mass.
Roller-Smith Co. 129 Broadway, New York, N. Y
Sangamo Elec. Co., Springfield, Ill.
Sheetfinder. See Eisemann Sheetfinder Co.
Standco. See Sticht Co., H. H.
States Co., Hartford, Conn.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio
Stewart Bros., Ottawa, Ill.
Sticht & Co., H. H., 13 Park Row, New York, N. Y.
Tanner Engrg. Co., Rawson St. and Nelson Ave., Long Island City, N. Y.
Test-A-Bat. See Beede Instrument Co.
Thomspon-Levering Co., 351 N. 57th, Philadelphia, Pa
Thomson. See General Electric Co.
Triplex Meters. See Roller-Smith Co.
3 in 1. See Sticht & Co., H. H.
Two-in-One. See Stitcht Co., Herman H.
United States Gauge Co., 44 Beaver, New York, N. Y.
Utility. See Esterline-Angus Co.
Westinghouse Electric & Mfg. Co., Newark, N. J.
Weston Elecl. Instrument Corp., 582 Freilinghuysen Ave., Newark, N. J.

INSULATION (Insulating) (Insulators)
Beads. See Beads, Insulating.
Canopy. See Insulators, Canopy.
Cloth. See Cloth & Paper.
Composition. See Molded Insulation.
Compound. See Wax and Comp.
Cutters. See Strippers, Wire.
Fibre. See Fibre.
Lava. See Cores, Resistance Coil.
Marble. See Slate
Mica. See Mica.
Molded. See Molded Insulation.
Paint. See Paint, Varnish, Laquer.
Paper. See Cloth and Paper Insulating.
Phenolic. See Fibre, Phenol. Also Molded Insulation
Porcelain. See Porcelain.
Rod. See Rubber, Hard.
Rubber. See Rubber, Hard.
Sealing Wax. See Wax and Compounds.
Slate. See Slate.
Soapstone. See Soapstone.
Tubing. See Tubing, Varnished Fabrics.
Varnish. See Paint and Varnish.
Wax. See Wax and Compounds.

INSULATING MACHINES, WIRE. See Wire Manufacturing Machines.
INSULATING TUBING. See Tubing, Varnished Fabric also Tubing, Rubber.

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Trenton, N. J.

INSULATION MIXERS

Baker Perkins Co., Saginaw, Mich.

INSULATION SHEARS. See Shears, Insulation.
INSULATION STRAINING MACHINES. See Wire Manufacturing Machines.
INSULATION TESTERS. See Instruments, Laboratory Standard.

INSULATORS, Canopy

Continental-Diamond Fibre Co., Newark, Del.
Franklin Fibre Specialty Co., Wilmington, Del.
General Electric Co., Schenectady, N. Y.
Macallen Co., 16 Macallen, Boston, Mass.
Wilmington Fibre Specialty Co., Wilmington, Del.

IRON CASTINGS. See Castings, Gray Iron.
IRONS, Soldering. See Soldering Irons.
JACKS, Armature. See Lifts, Armature.
JACKS, Radio. See Radio Receiver Parts.

JARS, Battery, Glass

For Composition Jars. See Molded Insulation; also Rubber.
Corning Glass Co., Corning, N. Y.
Cumberland Glass Mfg. Co., Bridgeton, N. J.
Gaynor Glass Works, Salem, N. J.
Gillinder & Sons, Inc., Philadelphia, Pa.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Macbeth-Evans Glass Co., Charleroi, Pa.
Rodefer Glass Co., 21st, Bellaire, O.
Sneath Glass Co., Wabash Ave., Hartford City, Ind.
United States Glass Co., 9th & Bingham, Pittsburgh, Pa.

JEWELS, Instrument Bearing

Bird, Richard H., Waltham, Mass.
Deknatel & Sons, J. A., Queens Village, N. Y.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Fisher, Thomas E., Penacook N. H.
Gatti, Inc., Aurele M., Liberty St. & Fairmount Ave., Trenton, N. J.
Mildrum Jewel Co., East Berlin, Conn.
Moser Jewel Co., 367 Division, Perth Amboy, N. J.
Sapphire Products Co., 51 Chambers, New York, N. Y
Universal. See Oefinger, J. L.
Wennstrom's Sons Co., John, Suffern, N. Y.
Worley Jewel Co., John, Waltham, Mass.

JOINTS, Fixture Insulating

Appleton Elec. Co., 1703 Wellington Ave., Chicago, Ill.
Macallen Co., 16 Macallen, Boston, Mass.
Sprecher Mfg. Co., P. W., 3300 North Ave., Milwaukee.
White Co., O. C., 15 Hermon, Worcester, Mass.
Wittenberg Bros., 60 Shipman, Newark, N. J.

LABORATORY (Laboratories.)
Ovens. See Ovens, Industrial & Laboratory.
Rheostats. See Rheostats.
Testing. See Testing.

LABORATORY STANDARD INSTRUMENTS. See Instruments, Laboratory Standard.
LACQUER, ARMATURE. See Paint, Varnish and Lacquer Metal. See Paint, Varnish and Lacquer.
LAMINATIONS. See Discs, Armature.
LAMP BASES. See Bases, Reading Lamp.
LAMP BULBS (Unfinished). See Bulbs, Glass.
LAMP FILAMENTS. See Filaments, Incandescent Lamp.
LAMP LEAD-IN WELDS. See Filaments, Incandescent Lamp.
LAMP MAKING MACHINES. See Machines, Lamp Making.
LAMP TESTING PHOTOMETERS. See Photometers, Lamp.

LATHES

(Special for use in Motor Repairing and Motor Mfg.—Test Bench Lathes).
Ajax Electric Co., Kalamazoo, Michigan.
Allen Electric & Equipment Co., Kalamazoo, Michigan.
Cincinnati Lathe & Tool Co., 3207 Disney (Oakley) Cincinnati, Ohio.
Hobart Bros. Company, Troy, Ohio. (Test Bench).
South Bend Lathe Works, 425 E. Madison, South Bend, Ind.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill.

LAVA. See Cores, Resistance Coil.

LEAD

American Lead Co., 3112 Penn Ave., Pittsburgh, Pa.
Columbia Smelting & Refining Wks., 365 West, New York, N. Y.
Federated Metals Corp., 233 Broadway, New York, N. Y.
Jacobson & Son Co., I. M., 15304 Idaho, Detroit, Mich.
National Lead Co., 111 Broadway, New York, N. Y.
United Metals Selling Co., 25 Broadway, New York, N. Y.

LEAD-IN WELDS, Lamp. See Filaments, Incandescent Lamp.
LEADS, FLEXIBLE (Commutator Brush). See Brushes.

LENSES

Sign Letter, Flashlight, Projector and Reflector Lenses Also glass caps, jewels and bezels for all electrical devices See also Jewels, Instrument Bearing.
American Gas Accumulator Co., Newark Ave., Elizabeth, N. J.
Bausch & Lomb Optical Co., 635 St. Paul, Rochester, N. Y. (Condensing and Projection Lenses.)

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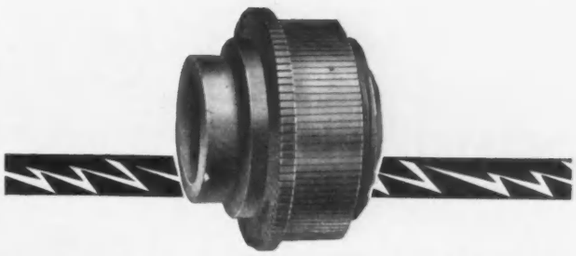

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Deknatel & Sons, J. A., Queens Village, N. Y.
Electric Power Equipment Corp., 412 W. 18th, Philadelphia, Pa.
Elpeco. See Electric Power Equipment Corp.
Goerz American Optical Co., C. P., 317 E. 34th, New York.
Jefferson Glass Co., Follansbee, W. Va. (Sign and Flashlight.)
Kliegl Bros. Universal Stage Ltg. Co., 321 W. 50th, New York, N. Y. (Condensing and Projector.)
Macbeth Evans Glass Co., Charleroi, Pa. (Flashlight.)
North Light Corp., 30 W. 13th, New York, N. Y.
Popper & Sons, Leo, 147 Franklin, New York, N. Y.
Pyle National Co., 1334 N. Kostner Ave., Chicago, Ill.
Rodefer Glass Co., 21st, Bellaire, O. (Flashlight.)
Sneath Glass Co., Wabash Ave., Hartford City, Ind. (Sign.)
Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.

LETTERS, Sign

Glass. Metal.
Adsign Corp, 113 W. 63rd, New York, N. Y.
Chain Products Co., 3924 Cooper Ave., Cleveland, O. (Brass and White Metal.)
Federal Elec. Co., 8700 S. State, Chicago, Ill. (Metal.)
Grammes & Sons, Inc., L. F., Allentown, Pa.

LIFTS, Armature

Lifts, Hoists, Jacks, Trucks, Buggies, Floor Cranes.
Columbia Machine Works & Malleable Iron Co., 263 Chestnut, Brooklyn, N. Y.
Duff-Norton Mfg. Co., Pittsburgh, Pa.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.
Ridlon Company, Frank, Boston, Mass.

LININGS, Socket

Remington Mfg. Co., 937 Barnum Ave., Bridgeport, Conn.
LOCK WASHERS. See Washers, Lock.
LOOP WINDERS & SPREADERS. See Winding Machines, Armature & Field Coil.
LOUD SPEAKER DIAPHRAGMS MATERIAL. See Cloth, Untreated; also Parchment Paper.

LOUD SPEAKERS

Manufacturers Units and Electric Pick-ups for Portable and Built-in Types.
Baritone Mfg. Co., 846 Jackson Blvd., Chicago, Ill.
Boudette Mfg. Co., 67 Crescent Ave., Chelsea, Mass.
Brooklyn Metal Stamping Corp., 720 Atlantic Ave., Brooklyn, N. Y. (Electric Pick-up.)
Cannonball. See Cannon & Miller Co.
Cannon & Miller Co., Springwater, N. Y.
Chelten Electric Co., 4859 Stenton Ave., Philadelphia, Pa.
Conamic. See Operadio Mfg. Co.
Decatur Mfg. Co., 45 Harman St., Brooklyn, N. Y.
Detroit Reproducers, Inc., Lafayette & Meldrum Sts., Detroit, Mich.
Duo-Lac. See F. & H. Radio Laboratories.
Dynola. See Utah Radio Products Co.
Electrical Research Laboratories, 2500 Cottage Grove Ave., Chicago, Ill. (Units.)
Empire United Hat Block Co., 312 E. 22nd, New York.
Feneo Cone Co., 57 Murray, New York, N. Y. (Kit.)
Fidelity Radio Corp., Walker Bank Bldg., Salt Lake City, Utah.
F. & H. Radio Laboratories, Fargo, N. D.
General Illuminating Co., 1101 Ocean Pkway, Brooklyn, N. Y.
Globe Technolian Corp., Reading, Mass.
G. R. P. See Penn Mfg. Co.
Jack Horner. See Operadio Mfg. Co.
Jensen Radio Mfg. Co., 6601 S. Laramie Ave., Chicago, Ill.
Kersten Radio Equipment, Inc., 1415 Fielford, Kalamazoo, Mich.
Kyle. See Newcombe-Hawley.
Magnavox Co., 4250 Horton, Oakland, Cal. Also Units.
Markone Radio Mfg. Co., 303 Devoe, Brooklyn, N. Y. (Horn.)
Miles Reproducer Co., 46 W. 14th, New York, N. Y.
Minuet. See Thompson Radio Co.
Newton Elec'l Mfg. Co., Newton, Mass.
O'Neil Mfg. Corp., 715 Palisade Ave., West New York, N.J.
Operadio Mfg. Co., St. Charles, Ill.
Peerless. See United Reproducers Corp.
Philadelphia Storage Battery Co., Ontario & C Sts., Philadelphia, Pa.
Philco. See Philadelphia Storage Battery Co.
Platter Cabinet Co., North Vernon, Ind.
Puroneer. See Platter Cabinet Co.
Quam Radio Products Co., Div. of United Air Cleaner Corp., 9705 Cottage Grove Ave., Chicago, Ill.
Racon Elec. Co., 18 Washington Place, New York, N. Y. (Horn only.)
Red Lion Cabinet Co., Red Lion, Pa.
Sonochorde. See Boudette Mfg. Co.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Swoboda Co., Maritime Bldg., Seattle, Wash.
Thompson Radio Co., 25 Church, New York, N. Y.
Universal. High Power Telephone Co., Carleton Ave. and Eddy, Seattle, Wash.
Utah Radio Products Co., 1737 S. Michigan Ave., Chicago, Ill. (Also Piano Unit.)
Utona. See American Radio Products Corp.
Wondrphone. See Universal High-Power Telephone Co.
Wright-De Coster, Inc., St. Paul, Minn.

LUGS, Copper

Anderson Mfg. Co., Albert & J. M., 289 A St., Boston.
Burke Elec. Co., 12th & Cranberry, Erie, Pa.
Dante Elecl. Mfg. Co., Bantam, Conn.
French Mfg. Co., Waterbury, Conn.
General Electric Co., Schenectady, N. Y.
Horan Co., E. S., 550 Monroe, Carlstadt, N. J.

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Sherman Mfg. Co., H. B., Battle Creek, Mich.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

LUMINOUS SPECIALTIES

KEY

Luminous Compound .....See C
Pendants (Bulbs) .....See P
Standard Parts .....See S

Bryant Electric Co., 1421 State, Bridgeport, Conn. .. P
Connecticut Elec. Mfg. Co., Bridgeport, Conn..... S
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis.
Eagelite. See Eagle Elec. Mfg. Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y..... P
General Elec. Co., Section W-329 (Merchandise Dept.), Bridgeport, Conn..... S P ..
Glo-Guide. See Bryant Elec. Co.
Glow Lite. See Bolaite Mfg. Co.
Hubbell, Inc. Harvey, Bridgeport, Conn..... P
Luma & Luma Lite. See Radium Dial Co.
National Appliance Co. (Div. of Reynolds Spring Co.), Jackson, Mich. .... S ..
Ranjeye. See General Electric Co.
Radium Dial Co., 3532 Forbes, Pittsburgh, Pa.... C .. P
Rodale Mfg. Co., Emaus, Pa..... P
Seelite. See L. C. Smith & Co.
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia P
Undark. See United States Radium Corp. and Bryant Elec. Co.
United States Radium Corp., 535 Pearl, New York, N. Y. ..... C S P

MACHINE SCREWS. See Screws, Machine.
MACHINE SCREW PRODUCTS. See Screw Machine Products.

MACHINES

Armature Banding. See Banding Machines, Armature
Armature Notching. See Notching Machines, Armature
Balancing. See Balancers, Armature.
Banding. See Banding Machines, Armature.
Cable Armoring. See Wire Manufacturing Machines.
Coil Taping. See Taping Machines, Coil.
Coil Winding. See Winding Machines.
Commutator Slotting. See Mica Undercutters.
Engraving. See Engraving Machines.
Incandescent Lamp Making. See Machines, Lamp Making
Molded Insulation. See Presses, Molded Insulation.
Perforating. See Perforating Machines.
Porcelain Molding. See Presses, Porcelain Molding
Radio Tube. See Machines, Lamp Making.
Shaping. See Shaping Machines, Coil.
Slotting. See Mica Undercutters.
Soldering. See Soldering Machines, Commutator.
Spring Making. See Spring Making Machines.
Taping. See Taping Machines, Coil.
Tension. See Tension Machines, Band Wire.
Winding. See Winding Machines.
Wire, Armoring. See Wire Manufacturing Machines.
Wire Drawing. See Wire Drawing Machinery.
Wire Insulator. See Wire Manufacturing Machines.
Wire Measuring. See Wire Manufacturing Machines
Wire Tension See Tension Machines, Band Wire.
Wire Wrapping. See Wire Wrapping Machines.

MACHINES, Lamp Making

For Making Incandescent Lamps and Vacuum Tubes.
Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Arrow Mfg. & Machine Co., North Bergen, N. J.
Serrenberg, R., 12 Farnham (Roxbury), Boston, Mass (Vacuum Pumps.)
Cherwenka, Frank, 35 Monroe, Passaic, N. J. (Bombarding Machines.)
Eisler Electric Corp., 770 S. 13th, Newark, N. J.
General Engineering & Supply Co., 160 5th Ave., New York N. Y. (Filament Winder.)
Gesco. See General Engineering & Supply Co.

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Sleeper & Hartley, Inc., Worcester, Mass.
York Elec. & Machine Co., 30 Penn, York, Pa.

MACHINES, Bembarding. See Machines, Lamp Making.
MACHINES, Pleating and Fluting. See Pleating Machines.
MACHINES, Spring Making. See Spring Making Machines.
MACHINES, WIRE MANUFACTURING. See Wire Manufacturing Machines.
MAGNET CHARGERS. See Chargers, Magnet.
MAGNET STEEL. See Steel, Magnet.
MAGNET TESTERS. See Instruments, Portable and Switchboard; also Instruments, Pocket.
MAGNET WIRE MACHINES. See Enameling Machines for Magnet Wire.
MAGNETIC CHUCKS. See Chucks, Magnetic.
MAGNETIC CLUTCHES. See Clutches, Magnetic.

MAGNETS, Lifting

Ohio Elec. Mfg. Co., 5905 Maurice Ave., Cleveland, O.
MAGNETOMETERS. See Instruments, Pocket.

MAGNETS, Permanent

Ind. Steel Products Co., 4545 S. Western Blvd., Chicago.
Rogers Drop Forging Co., Worcester, Mass.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.

MALLETS, Raw Hide

Chicago Rawhide Mfg. Co., 1237 Elston Ave., Chicago, Ill.
Garland Mfg. Co., Saco, Me.
Holbrook Raw Hide Mfg. Co., 748 N. Main, Providence, R. I.
MANGANESE, Battery. See Chemicals, Battery.

MARKERS AND STAMPERS, Metal

Schmidt, Inc., Geo. T., 4102 Ravenswood Ave., Chicago, Ill.
MEASURING INSTRUMENTS. See Instruments.
METAL CUTTING OUTFITS. See Welding and Cutting
MECHANICAL RUBBER GOODS. See Rubber Mechanical Goods.
MEGOHMMETERS. See Instruments. Laboratory Standard

MELTING POTS AND LADLES, SOLDER, ETC.

Dunco. See Struthers Dunn, Inc.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
MERCURY SWITCHES. See Switches, Mercury.
METAL CLEANERS (Compound). See Cleaners, Metal.
METAL FINISHING. See Plating & Finishing.
METAL MARKING OUTFITS. See Engraving Machines.
METALLIC SHADES. See Shades, Metallic.
METERS. See Instruments.
MICA SHADES. See Shades, Mica.
MICA TAPE. See Tape, Mica.
MICA UNDERCUTTERS. See Slotting Machines & Tools. Commutator.

MICA

Asheville Mica Co., Biltmore, N. C.
Asco. See Schoonmaker Insulation Co.
Brand & Co., William, 268 Fourth Ave., New York, N. Y.
Colonial Mica Co., 136 Seventh, Jersey City, N. J.
Continental Diamond Fibre Co., Newark, Del.
Ford Radio & Mica Corp., 830 Fourth Ave., Brooklyn, N. Y.
Gerdau Co., Otto, 533 Canal, New York, N. Y.
Gillespie-Rogers-Pyatt Co., Inc., 99 John, New York, N. Y.
Hirsch Mica Co. 1087 Flushing Ave., Brooklyn, N. Y.
Hoyt, Inc., Philip S., Los Tablos, New Mexico.
Huse-Liberty Mica Co., 73 Long Wharf, Boston, Mass.
International Mica Co., 3660 Brandywine, Philadelphia, Pa.
Kant Krack. See Huse Liberty Mica Co.
Keene Mica Co., Keene, N. H.
Macallen Co., 16 Macallen, Boston, Mass.
Micabond. See Continental Diamond Fibre Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Micalite. See Mitchell-Rand Mfg. Co.
Mica Co. of Canada (N.Y.), Inc., Massena, N. Y.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mica Mfg. Co., 135 Johnson, Brooklyn, N. Y.
Micanite. See Mica Insulator Co.
Mica Products Mfg. Co., 54 Greene, New York, N. Y.
Munsell & Co., Eugene, 200 Varick, New York, N. Y.
Nemco. See New England Mica Co.
New England Mica Co., Waltham, Mass.
New England Minerals, Inc., 85 Devonshire, Boston, Mass
New York Mica & Mfg. Co., Auburn, N. Y
Orinal & Co., 103 Park Ave., New York, N. Y.
Peerless. See New England Mica Co.
Red Line. See Huse Liberty Mica Co. (Ground Mica.)
Red Streak. See Huse Liberty Mica Co.
Schoonmaker Insulation Co., A. O., 34 University Place, New York, N. Y.
Storrs Mica Co., 11 Park Place, New York, N. Y.
Tar Heel Mica Co., Plumtree, N. C.
Watson Bros., 170 Purchase, Boston, Mass.
MINIATURE SWITCHBOARD SYSTEMS. See Instruments, Portable and Switchboard.
MIXERS, INSULATION. See Insulation Mixers.

MOLDED

Presses. See Presses, Molded Insulation.
Radio Parts. See Radio Molded Parts.
Shades. See Molded Insulation.

MOLDED INSULATION

Alco. See American Insulator Corp.
Aldur Corp., 40 Flatbush Ave. Ext., Brooklyn, N. Y.
Arcolite. See American Insulator Corp.
Aladdinite Co., Orange, N. J. (Caseine.)
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American Insulator Corp., New Freedom, Pa.
American Machine & Foundry Co., 5520 Second Ave., Brooklyn, N. Y.
American Record Corp., Scranton, Pa.
Amerine. See American Insulator Corp.
Auburn Button Wks., 48 Canoga, Auburn, N. Y.
Bakelite Corp., 247 Park Ave., New York, N. Y.
Bay State Moulding Co., 1197 Dorchester Ave., Boston.
Beatsol Corp., 226 Hillside Ave., Hillside, N. J.
Belden Mfg. Co., 4633 W. Van Buren, Chicago, Ill.
Bell Mfg. Co., 11 Elkins, Boston, Mass. Radio Parts.
Bettle. See Synthetic Plastics Co., Inc.
Boonton Molding Co., 300 Myrtle Ave., Boonton, N. J.
Boonton Rubber Mfg. Co., 223 Fanny Rd., Boonton, N. J.
Celluloid Corp., 10 E. 40th, New York, N. Y.
Cepco. See Monowatt Corp.
Catec. See Monowatt Corp.
Catelite. See Monowatt Corp.
Celtrock. See Colt's Patent Firearms Mfg. Co.
Chicago Molded Products Co., 2144 Walnut, Chicago, Ill
Cincinnati Molding Co., 2037 Florence Ave., Cincinnati, O.
Colasta Co., Hoosick Falls, N. Y.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Compo-Site, Inc., 207 Astor, Newark, N. J.
Condenalite. See Bakelite Corp.
Connecticut Elec. Mfg. Co., Bridgeport, Conn
Continental-Diamond Fibre Co., Newark, Del.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Dayton Insulating Molding Co., 434 E. First, Dayton, Ohio
Diemolding Corp., Canastota, N. Y.
Dimco. See Dayton Insulating Moulding Co.
Durez. See General Plastics, Inc.
Electrical Insulation Corp., 308 W. Washington, Chicago, Ill.
Electrose. See Insulation Mfg. Co.
Erinoid Co., 205 E. 42nd, New York, N. Y.
Evercool. See Bakelite Corp.
Formica Insulation Co., 4626 Spring Grove Ave., Cincinnati, O.
Garfield Mfg. Co., Garfield, N. J. Composition. (Cold.)
General Electric Co., Schenectady, N. Y.
General Moulded Composition Co., 212 Market, Lynn, Mass
General Plastics, Inc., 99 E. Walck Rd., North Tonawanda, N. Y.
Grotelite Co., Grandview & Lafayette Aves., Bellvue, Ky
Gummor. See Garfield Mfg. Co.
Hahn Mfg. Co., Harry W., 623 S. San Pedro, Los Angeles, Cal.
Hemmit. See Garfield, Mfg. Co.
Herculite. See Colosta Co.
Hi-Heet. See Insulation Mfg. Co.
Imperial Molded Products Co., 2935 W. Harrison, Chicago.
Improco. See Insulation Products Co.
Inda. See American Machine & Foundry Co.
Insulation Mfg. Co., New York Ave. and Herkimer St., Brooklyn, N. Y.
Insulation Products Co., 404 Richland, Pittsburgh, Pa.
International Insulating, Division of General Industries Co., Elyria, O.
Karolith Corp., 2125 44th Rd., Long Island City, N. Y. (Casein plastics.)
Kellite. See Kellogg Switchboard & Supply Co.
Kellogg Switchboard & Supply Co., 1066 W. Adams, Chicago, Ill.
Klagges, Chas., 128 147th, Ozone Park, N. Y.
Kuhn & Jacob Machine & Tool Co., 502 Prospect Ave., Trenton, N. J.
Kurz-Kasch Co., S. Broadway & Morris, Dayton, O.
Lacanite. See Scranton Button Co.
Luco Products Corp., 40 Flatbush Ave. Extension, Brooklyn, N. Y.
Lumarith. See Celluloid Corp.
Luxite. See Wilbur & Williams Co
Macallen Co., 16 Macallen, Boston, Mass.
Mack Molding Co., Wayne, N. J.
Makalot. See Johnson Molding & Tool Co.
Megohom. See Waterbury Button Co.
Micarta Fabricators, Inc., 309 Canal, New York, N. Y.
Micarta. See Westinghouse Elec. & Mfg. Co
Mico. See Molded Insulation Co.
Modern Molded Products Co., Blount and Elm Sts., Providence, R. I.
Moldarta. See Westinghouse Elec. & Mfg. Co.
Molded Insulation Co., 3246 Ludlow, Philadelphia, Pa.
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
National Appliance Co. (Div. of Reynolds Spring Co.) Jackson, Mich.
Niagara Insul-Bake Specialty Co., 483 Delaware Ave., Albany, N. Y.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Norlec. See Norton Laboratories, Inc.
Northern Industrial Chemical Co., 11 Elkin (South Boston), Boston, Mass.
Norton Laboratories, Inc., Div. 85, Lockport, N. Y.
Panelyte Corp., Lincoln Bldg., New York, N. Y.
Paramix. See Splitdorf Radio Corp.
Paratherm. See Scranton Button Co.
Phenolic. See Scranton Button Co.
Plastic Molding Corp., Sandy Hook, Conn. (Cold.)
Pollopas. See Wilbur & Williams.
Pruven Composition Products Corp., Milford, Conn
Pruvenite. See Pruven Composition Products Co
Pyrolax. See Cutler-Hammer Mfg. Co.
Recto Mfg. Co., Appleton & B.&O. R.R., Cincinnati, O.
Redmonol. See Bakelite Corp.
Rexlite. See Northern Industrial Chemical Co.
Reynolite. See National Appliance Co.
Reynomold. See National Appliance Co.
Richardson Co., Lockland, Cincinnati, O.
Ridgelite. See Ridgley Trimmer Co.
Ridgley Trimmer Co., Springfield, O.
Schneider Bros., Inc., 312 N. Sheldon Ave., Chicago.
Shaw Insulator Co., Irvington, Newark, N. J.
Siemon Co., State and Dewey, Bridgeport, Conn.
Specialty Insulation Mfg. Co., Hoosick Falls, N. Y.
Star Insulate. See Insulation Mfg. Co.
Starlite. See Insulation Mfg. Co.
Stokes Rubber Co., Jos., Trenton, N. J.
Stokes & Smith Co., Summerdale Ave. near Roosevelt Blvd., Philadelphia, Pa.
Synthetic Plastic Co., Inc., 535 Fifth Ave., New York, N. Y. (Molding Powder).
Textolite. See General Elec. Co., also Electrical Insulation Corp.
Thermoplax. See Cutler-Hammer Mfg. Co.
Tegit. See Garfield Mfg. Co.
Union Insulating Co., Parkersburg, W. Va.
Vulcabeston. See Colt's Patent Fire Arms Mfg. Co.
Vulcanized Rubber Co., 251 Fourth Ave., New York, N. Y
Waterbury Button Co. (Elect. Mfg. Dept.), Waterbury, Conn.
Watertown Mfg. Co., Watertown, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilbur & Williams Co., 261 Park Square Bldg. Boston, Mass. (Molding Powder.)

MOLYBDENUM

American Electro Metal Corp., 65 Madison Ave., New York, N. Y.
Callite Products, 540 Gregory Ave., Union City, N. J.
Eisler Electric Corp., 770 So. 13th St., Newark, N. J.

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Lohfeld & Co., J. L., 53 Park Place., New York, N. Y
Mallory & Co., P. R., 329 E. Washington, Indianapolis, Ind.
Palatine Industrial Co., 111 Fifth Ave., New York, N. Y
Sirian Wire Co., 255 Sherman Ave., Newark, N. J.

MONEL METAL

International Nickel Co., 67 Wall, New York, N. Y.

MOTOR CONTROLLERS. See Controllers, Motor.
MOTOR PLATFORM BASES. See Bases, Motor Platform
MOTOR STARTERS. See Controllers, Motor; Switches, Remote Control; Switches, Motor Starting; Safety; Switches Snap (Heavy Duty).

MOTORS

Alternating Current ..... See S
Direct Current ..... See S
Motors, 1 Hp. up ..... See M
Motors Fractional Hp. ..... See F
Universal ..... See U

Actodector. See Roth Bros. Co., Div. of Century Electric Co.
Advance Elec. Co., 4311 Maple Ave., St. Louis M F S ..
Allis-Chalmers Mfg. Co., Milwaukee, Wis..... M .. S ..
Allis Co., Louis, Milwaukee, Wis..... M .. S ..
American Elec. Motor Co., Cedarburg, Wis..... M .. .. ..
Apex Elec'l Mfg. Co., 1067 E. 152nd, Cleveland .. F S U
Armor Elec. Mfg. Co., 1200 Hilliard, Erie, Pa. M .. .. ..
Baldor Elec. Co., 4352-D Duncan Ave., St. Louis ..... M F S ..
B-Line. See Brown-Breckmeyer Co.
Bodine Elec. Co., 2256 W. Ohio, Chicago..... F S U
Bogue Elec. Co., Chas. J., 132 King, New York M .. .. ..
Brown-Brockmeyer Co., Norwood Power Bldg., Dayton, O..... M F .. ..
Burke Elec. Co., Erie, Pa..... M F S U
B. T. See Allis Co., Louis.
B & B Mfg. Co., 812 Lafayette, Toledo, O..... .. F .. ..
Century Elec. Co., 1806 Pine, St. Louis, Mo.. M F S ..
Chandeysson Elec. Co., St. Louis, Mo..... M .. S ..
Clark, Jr., Elec. Co., James, 600 E. Bergman, Louisville, Ky. ..... M .. .. ..
Cleveland Armature Wks., 4732 St. Clair Ave., Cleveland, O. ..... M .. S ..
Comet Elec. Co., 47 Union Trust Bldg., Indianapolis, Ind.
Continental Elec. Co., 323 Ferry, Newark..... M .. S ..
Crocker-Wheeler Elec. Mfg. Co., Ampere, N. J. M .. S ..
Cushman Elec. Co., 69 S. Main, Concord, N. H. M F S ..
Diehl Mfg. Co., Elizabeth, N. J. ..... M F S ..
Diverter Pole. See Rochester Elec. Product Co.
Domestic Electric Co., Kent, O...... .. .. S U
Dumore Co., 35 16th, Racine, Wis..... .. F .. U
Edco. See Electro Dynamic Co.
Electric Machinery Mfg. Co., 1331 Tyler, Minneapolis, Minn. ..... M .. S ..
Electric Products Co., 1725 Clarkstone Rd., Cleveland, O. ....
Electric Specialty Co., 291 South Stamford, Conn. M F S U
Electro Dynamic Co., Bayonne, N. J..... M .. S ..
Emerson Electric Mfg. Co., 2018 Washington Ave., St. Louis, Mo..... M F S U
Esco. See Electric Specialty Co.
Fairbanks-Morse & Co., 900 S. Wabash Ave., Chicago, Ill. ..... M F .. ..
Fidelity Elec. Co., Lancaster, Pa. ..... M F S ..
Fitzgerald Mfg. Co., Torrington, Conn..... .. F .. ..
Fynn Weichsel. See Wagner Elec. Corp.
Galvin Elec. Mfg. Co., 3314 S. Broadway, St. Louis, Mo. ..... F .. S ..
General Electric Co., Schenectady, N. Y..... M F G ..
Gilbert Co. A. C., New Haven, Conn..... .. F .. U
Hamilton Beach Mfg. Co., Racine, Wis..... .. F S U
Hobart Bros. Co., Troy, O..... M .. S ..
Holtzer-Cabot Elec. Co., 125 Amory, Boston... M F .. ..
Howell Elec. Motors Co., Howell, Mich..... M F S ..
Ideal Elec. & Mfg. Co., First & Oak, Mansfield, O. ..... M .. S ..
Imperial Electric Co., Akron, O..... M .. S ..
Janette Mfg. Co., 556 W. Monroe, Chicago..... .. F S ..
Jantz & Leist Elec. Co., Western Ave. & York, Cincinnati, O. ..... M F .. ..
Kendrick & Davis Co., Lebanon, N. H..... .. F S ..
Kimble Elec. Co., 634 N. Western Ave., Chicago M .. S U
Leland Elec. Co., Dayton, O..... .. F S ..
L. E. See Leland Elec. Co.
Lincoln Elec. Co., Cleveland, Ohio..... M .. S ..
Line-Weld. See Lincoln Elec. Co.
Linzee Elec. Motor Co., Mansfield, O..... M .. .. ..
Mando Co., 911 State Tower Bldg., Syracuse, N. Y. (6-12-40 Volt only)..... .. F .. ..
Marathon Elec. Mfg. Co., 32 Island, Wausau, Wis. .. F .. ..
Marble-Card Elec. Co., Gladstone, Mich..... M .. .. ..
Master Electric Co., Dayton, O..... M F S ..
MC. See General Electric Co.
Michigan Elec. & Mfg. Co., Lake Linden, Mich. .. F S ..
Norfolk. See Walter Elec. Mfg. Co.
North East Appliance Corp., Rochester, N. Y. .. F .. U
Northwestern Mfg. Co., 480 Clinton, Milwaukee M .. .. ..
Ohio Elec. Mfg. Co., 5905 Maurice Ave., Cleveland, Ohio .... F S ..
O. K. See Marathon Elec. Mfg. Co.

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Peerless Elec. Co., 740 W. Market St., Warren, O. M F S U
Polar Cub. See Gilbert Co., A. C.
Pow-R-Full. See Wagner Elec. Corp.
Reco. See Reynolds Electric Co.
Red Band. See Howell Elec. Motors Co.
Reliance Elec. & Engrg. Co., 1042 Ivanhoe Rd., Cleveland, O. ..... M .. S ..
Reynolds Electric Co., 3650 W. Congress, Chicago .. F S ..
Robbins & Myers, Inc., Springfield, O..... M F S U
Roth Bros. & Co., Div. of Century Elec. Co., 1400 W. Adams, Chicago, Ill..... M F S ..
Standard. See Robbins & Myers Co.
Star Elec. Motor Co., Miller St. & N. J. R. R. Ave., Newark, N. J. ..... M .. S ..
Sterling Elec. Motors, Inc., Telegraph Rd. and Atlantic Blvd., Los Angeles, Cal..... M .. S ..
Stow Mfg. Co., 443 State, Binghamton, N. Y. M F S U
Sturtevant Co. (Hyde Park), Boston, Mass..... M F S U
Sunlight Electrical Mfg. Co., Dana Ave., Warren, O. .... F S ..
Super Wick. See Master Elec. Co.
Switch Start. See Lincoln Elec. Co.
Troy Engine & Machine Co., Engberg's Div., St. Joseph, Mich. ..... M .. S ..
Union Elec. Motor Mfg. Co., Hancock & Oxford Sts., Philadelphia, Pa..... M F S ..
U. S. Elec. Mfg. Co., 200 E. Slawson Ave., Los Angeles ..... M .. S ..
Valley Elec. Co., 4221 Forest Park Blvd., St. Louis, Mo. ..... M .. S ..
Wagner Elec. Corp., 1935 Indiana Ave., St. Louis, Mo. ..... M F S U
Walter Elec. Mfg. Co., 215 Cumberland, Norfolk, Va. ..... M .. S ..
Watson. See Allis Co., Louis.
Welco Uniframe. See Wesche Elec. Co., B. A.
Wesche Elec. Co., B. A., 1642 Vine, Cincinnati M F S ..
Westinghouse Elec. Mfg. Co., East Pittsburgh M F S ..
Woods Mach. Co., S. A., 27 Damrell, Boston. M F S ..
Zobell Elec. Motor Co., 94 South, Garwood, N. J. ..... M .. S ..

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See also Decalcomania.

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Angell Embossing Co., 37 Barney-Smith Co., Dayton, O.
Chandler Co., Springfield, Mass.
Continental-Diamond Fibre Co., Newark, Del.
Crowe Name Plate & Mfg. Co., 1749 Grace, Chicago, Ill.
Electro-Chemical Engraving Co., 52 Vanderbilt Ave., New York, N. Y.
Etched Products Corp., 90 Tenth, Long Island City, N. Y.
Etching Co. of America, 1520 Montana, Chicago, Ill.
General Etching & Mfg. Co., 3072 W. Grand Ave., Chicago, Ill.
Grammes & Sons Inc., L. F., Allentown, Pa.
Mayer & Co., Geo. J., 36 S. Meridian, Indianapolis, Ind.
Mechanical Engraving Co., 130 Orchard, Newark, N. J.
Premier Metal Etching Co., 14th & Van Alst Ave., Long Island City, N. J.

NICKEL

Driver-Harris Co., Harrison, N. J.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
International Nickel Co., 67 Wall, New York, N. Y.
National-Harris Wire Co., Newark, N. J.
Seymour Mfg. Co., Seymour, Conn.
NICKEL WIRE CLOTH. See Cloth, Wire.

NOTCHING MACHINES, Armature

Ferracute Machine Co., Bridgeton, N. J.
Niagara Machine & Tool Wks., 637 Northland, Buffalo, N. Y.

NUT SETTING MACHINES

Vim Electric Tool Co., 149 Broadway, New York, N. Y.
OHMMETERS. See Istruments, Laboratory Standard; also
OIL CUPS. See Cups, Oil.
Instruments, Portable and Switchboard.
OIL-LESS BEARINGS. See Bearings, Oil-less.
OSCILLOSCOPES. See Instruments, Laboratory Standard

OVENS, Industrial and Laboratory

Annealing, Temper Drawing, Mold Baking, Vulcanizing Drying, Conditioning, Enameling, Japanning. Vacuum Impregnating.

Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Bellevue Industrial Furnace Co., 2971 Bellevue Ave., Detroit, Mich.
Buffalo Fdry. & Machine Co., 1543 Fillmore, Buffalo N. Y. (Armature and Coil.)
Conran, Frederick M., 107 Colden, Newark, N. J.
Crawford Oven Co., 308 W. Water, New Haven, Conn. (Coil Driers.)
Despatch Oven Co., 622 Ninth, S. E., Minneapolis, Minn.
Detroit Sheet Metal Wks., 1300 Oakman, Detroit, Mich.
Devine Mfg. Co., J. P., Mount Vernon, Ill.
Eberbach & Son Co., Ann Arbor, Mich. (Drying.)
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Emerson Apparatus Co., 171 Tremont, Melrose, Mass. (Conditioning.)
Freas Thermo Elec. Co., 1206 Grove, Irvington, N. J.
Gehnrich Oven Co., 42-03 35th, Long Island City, N. Y.
General Electric Co., Schenectady, N. Y.
Hayes, C. I., 129 Baker, Providence, R. I.
Heidbrink Co., 2633 Fourth Ave., S., Minneapolis, Minn
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Jiffy. See Sioux Battery & Mfg. Co.
Kenworthy, Chas. F., 198 Piedmont, Waterbury, Conn.
Lydon Bros., 229 Colden, Jersey City, N. J.
Maehler Co., Paul, 2220 West Lake, Chicago, Ill.
Miho Co., 717 Sycamore, Cincinnati, O.
Sargent & Co., E. H., 155 E. Superior, Chicago, Ill.
Sioux Battery & Mfg. Co., Sioux City, Ia. (Battery.)
Steiner & Co., E. E., 197 E. Kinney St., Newark, N. J.
Stokes Machine Co., F. J., Tabor Rd. (Olney), Philadelphia
Swartwout Co., 18522 Euclid Ave., Cleveland, O.
Thelen. See Freas Thermo Elec. Co.
Westinghouse Elec. & Mfg. Co., Mansfield, O.
Young Bros. Co., 6523 Mack Ave., Detroit, Mich.
OXIDES, Battery. See Chemicals, Battery.

PACKING

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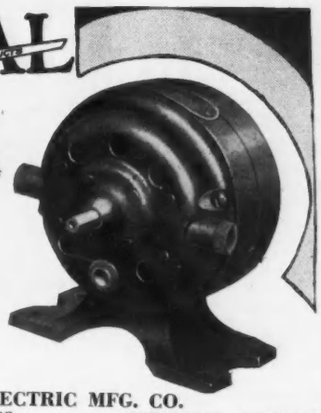

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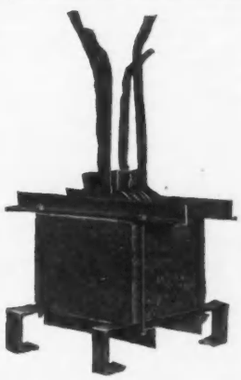

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Armoriac. See Armitage Co., John L.
Aroiac. See Arizona Lacquer Mfg. Co.
Art-Craft. See Southwestern Paint & Varnish Co.
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Mazo. See Henry V. Walker Co.
Mica Insulator Co., 200 Varick St., New York. . . . V . . .
M. I. C. See Mica Insulator Co.
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Torrid. See Beardsley & Wolcott Mfg. Co
Triple Tap. See General Elec. Co.
Twin Tap. See General Elec. Co.
United States Elec. Mfg. Corp., 222 W. 14th, New York.
Victory. See Beaver Mfg. Company.
Weber. See Sears, Henry D.
Wellmade Elec. Mfg. Co., Torrington, Conn.
Wilshires. See Iona Co.
Yankee. See Beaver Mfg. Co.
POCKET METERS. See Instruments, Pocket

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Hardy Metal Corp., Seattle, Wash.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Interstate Products Corp., 503 Mulberry, Newark, N. J. (Platinum and Silver.)
Mallory & Co., P. R., 329 E. Washington, Indianapolis, Ind.
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Tungsten Electric Corp., 545 39th, Union City, N. J.
Wilco. See Wilson Co., H. A.
Wilson Co., H. A., Newark, N. J. (Platinum and Silver.)
POLARITY INDICATORS. See Instruments, Pocket.
POLISHING MACHINES, WIRE. See Wire Polishing Machines.

PORCELAIN
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Bushings. See Bushings, Box & Cabinet.
Cement. See Cement, Liquid, Porcelain.
Insulators. See Porcelain.
Liquid. See Cement, Liquid Porcelain.
Molding Machine. See Presses, Porcelain Molding.
Reflectors (Enameled). See Reflectors, Porcelain Enameled
Refractory. See Cores, Resistance Coil.
Tubes. See Porcelain.

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A. P. See Akron Porcelain Co.
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Challenge Stamping & Porcelain Co., Grand Haven, Mich.
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Crowlite. See Crowley & Co.
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Morse Co., Frank W., 291 Congress, Boston. (Spring Grip.)
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Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill.
Quality. See H. H. Eby Mfg. Co.
Queen. See Morse Co., Frank W.
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Waterbury Button Co. (Elect. Mfg. Dept.), Waterbury, Conn.
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POTENTIOMETERS (Radio Control). See Radio Receiver Parts.
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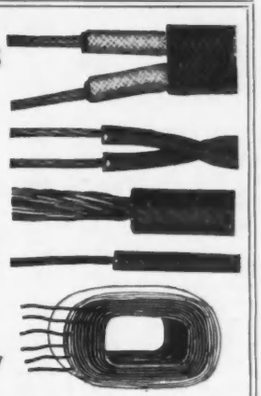

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Akra-Ohm. See Shallcross Mfg. Co.
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Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Amerchoke. See American Transformer Co.
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Amperite Rheostat. See Radiall Co.
Amrad Corp., Medford, Hillside, Mass. (Electrolytic Condensers.)
Arco Elec'l Corp., 311 E. Columbia, Fort Wayne, Ind
Arctic. See Premier Elec. Co.
Art Dial. See Pilot Radio & Tube Corp.
Audioformer Transformer. See Pacent Electric Co.
Autoformer. See Thordarson Elec. Mfg. Co.
Automatic Oil Heat Co., 92 E. Fourth, St. Paul, Minn.
Automotive Parts Mfg. Co., 70 Washington St., Brooklyn.
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Benjamin Elec. Mfg. Co., Des Plaines (Chicago Suburb), Ill.
Bonine. See Turn-it Radio Sales.
Branston Co., Chas. A., 299 Ellicott, Buffalo, N. Y. (Honeycomb Coil.)
Brooklyn Metal Stamping Corp., 718 Atlantic Ave., Brooklyn, N. Y.
Browning-Drake Corp., Calvary, Waltham, Mass.
Buffalo. See De Jur-Amsco Corp.
Campbell Electric Mfg. Co., 15 Stewart, Lynn, Mass.
Capacigrad. See Pilot Radio & Tube Corp.
Cardwell Mfg. Corp., Allen D., 81 Prospect, Brooklyn, N. Y
Carter Radio Co., Div. of Utah Radio Products Co., 18th & Michigan Ave., Chicago, Ill.
Centraline. See Pilot Radio & Tube Corp.
Certified Condenser. See Radio Condenser Co.
Chelten Elec. Co., 4859 Stenton Ave., Philadelphia, Pa.
Clarostat Mfg. Co., 281 N. Sixth, Brooklyn, N. Y. (Radio Resistance.)
Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O.
Concertone. See Chicago-Jefferson Fuse.
Connectorads. See Alden Mfg. Co.
Continental Carbon, Inc., 1304 Lorain, Cleveland, O.
Continental. See Gardiner & Hepburn, Inc
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Cresradio Corp., 168-32 Jamaica Ave., Jamaica, N. Y
Croft. See Premier Elec. Co.
Daven Co., 158 Summit, Newark, N. J. (Kits)
Davohn. See Daven Co.
DeForest Radio Co., Passaic, N. J.
De Jur-Amsco Corp., Broome and Lafayette Sts., New York, N. Y.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
Dubilier Condenser Corp., 342 Madison av., New York
Dumont Elec. Co., 40 W. 17th, New York, N. Y.
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Durham & Co., 1936 Market, Philadelphia, Pa.
Dynohmic. See Lynch, Inc.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
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Electrical Research Laboratories, 2500 Cottage Grove Ave. Chicago, Ill.
Electro Motive Engineering Corp., 127 W. 17th, New York
Elkay. See Langbein Kaufman Radio Co.
El Menco. See Electro Motive Engineering Co.
E-Z. See Polymet Mfg. Corp.
Faraday. See Wireless Specialty Apparatus Co
Fast & Co., John E., 3123 N. Crawford Ave., Chicago, Ill.
Ferranti, Inc., 130 W. 42nd, New York, N. Y.
Filatrol. See De Jur-Amsco Corp.
Filterettes. See Tobe Deutschmann Co.
Flechtheim Co., A. M., 136 Liberty, New York, N. Y.
Ford Radio & Mica Corp., 830 4th Ave., Brooklyn, N. Y.
Frost, Inc., Herbert H., 1142 W. Beardsley, Elkhart, Ind
Furnell Die Cast Condenser Corp., 16 Hudson, New York
F. & H. Radio Laboratories, Fargo, N. D.
Gardiner & Hepburn, Inc., 611 Widener Bldg., Philadelphia, Pa.
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Gen-Win. See General Winding Co.
Glastor. See Daven Co.
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Hedgehog Transformer. See Premier Elec. Co
Heinemann Elec. Co., Penn. Ave. & Plum, Trenton, N. J.
Hy-Wat. See Electro Motive Engineering Corp.
Igrad Condenser & Mfg. Co., 4322 Lake Ave., Rochester N. Y.
Infra-Dyne. See Gray & Danielson Co.

International Resistance Co., 2006 Chestnut, Philadelphia, Pa
Isograd, Isolesk. See Pilot Radio & Tube Corp.
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Kuprox. See Kodel Radio Corp.
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Merchon. See Amrad Corp.
Metaleak. See Dubilier Condenser Corp.
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Perry Elec'l Resistor Corp., 280 New Main St., Yonkers N. Y.
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Pierce Airo. See United Scientific Laboratories.
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Power Box. See Scott Sales Co.
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Supertran Transformer. See Ford Radio & Mica Co
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Syncrodenser. See Precise Mfg. Corp.
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Univernier Condenser. See Auburn Button Works
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Volta. See Universal Electro Chemical Corp.
Volumgrad. See Pilot Radio & Tube Corp.
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Wasp. See Pilot Radio & Tube Corp.
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RADIO MOUNTINGS

Coil Mountings, Coil Sliders and Rods, Switches, Detectors Detector and Grid Leak Mountings, Panel Brackets, Special Radio Hardware & Trimmings, Metal Dials, Metal Panels etc.

Aerovox Wireless Corp., 70 Washington, Brooklyn, N. Y.
Alden Mfg. Co., Brockton, Mass.

American Radio Hardware Co., 135 Grand, New York
Bonza. See Haydon & Haydon.
Carborundum Co., Niagara Falls, N. Y. (Detector.)
De Jur-Amsco Corp., Broome and Lafayette Sts., New York, N. Y.
Chapman Machine Co., Terryville, Conn.
Durham & Co., 1936 Market, Philadelphia, Pa.
Electrad, Inc., 173 Varick, New York, N. Y.
Etched Products Corp., 99 Tenth, Long Island City, N. Y (Metal Panels.)
Eureka. See Morse Co Frank W.
General Etching & Mfg. Co., 3072 West Grand Ave., Chicago, Ill. (Metal Panels & Escutcheons.)
Glass Technician Corp., Reading, Mass.
Hart & Hegeman Mfg. Co., Hartford, Conn.
Haydon & Haydon, 167 Chambers, New York, N. Y.
Master Engineering Co., 771 Mather, Chicago, Ill.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Na-Ald. See Alden Mfg. Co.
Union Insulating Co., 296 Broadway, New York, N. Y.
Waddell Mfg. Co., Grand Rapids, Mich.
Yaxley Mfg. Co., 1528 W. Adams, Chicago, Ill.

RADIO PANEL ENGRAVING. See Engraving, Radio Panel

RADIO RECEIVER PARTS

Rheostats, Sockets, Plugs, Jacks.
Alden Mfg. Co., Brockton, Mass.
Acme Elec. & Mfg. Co., 1439 Hamilton Ave., Cleveland, O.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Amacostat. See American Apparatus Co.
American Apparatus Co., Richmond, Ind.
Automotive Equipment Co., 317 Halsey, Newark, N. J.
B. M. S. See Brooklyn Metal Stamping Corp.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. (Multiple Plugs.)
Benjamin Elec. Mfg. Co., Des Plaines (Chicago Suburb), Ill.
Brach Mfg. Corp., L. S., 120 Sussex Ave., Newark, N. J.
Brooklyn Metal Stamping Corp., 718 Atlantic Ave., Brooklyn
Cabelug. See Jones, Howard B.
Carter Radio Co., Div. of Utah Radio Products Co., 18th & Michigan Ave., Chicago, Ill. (Also Socket Adapters.)
Cinch Mfg. Corp., 2335 W. Van Buren, Chicago, Ill.
Clarostat Mfg. Co., 281 N. Sixth, Brooklyn, N. Y.
Cle-Ra-Tone. See Benjamin Elec. Mfg. Co.
D. A. Radio Co., 30 Hollister, Buffalo, N. Y.
De Jur-Amsco Corp., Broome and Lafayette Sts., New York, N. Y.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
Duostat. See De Jur-Amsco Corp.
Dynofilter Mfg. Co., 1022 E. 178th, New York, N. Y. (Interference Eliminator).
Eby Mfg. Co., H. H., 22nd & Lehigh Ave., Philadelphia.
Electrad, Inc., 173 Varick, New York, N. Y.
Electrical Insulation Corp., 308 W. Washington, Chicago.
Fantail Plug. See Brooklyn Metal Stamping Corp.
Frost, Herbert H., 1142 W. Beardsley, Elkhart, Ind.
Gem-Jac. See Frost, Herbert H.
General Instrument Corp., 225 Varick, New York, N Y
General Radio Co., 30 State, Cambridge, Mass.
Gray & Danielson Mfg. Co., 2101 Bryant, San Francisco.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Heinemann Elec. Co., Penn Ave. & Plum, Trenton, N. J.
Imp. See Carter Radio Co.
Jones, Howard B., 2300 Wabansia, Chicago. (Multiple Plug)
Martin-Copeland Co., 101 Sabin, Providence, R. I.
Micrograd. See Pilot Radio & Tube Corp.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Nutmeg. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Pacent Elec. Co., 91 Seventh Ave., New York, N. Y.
Pan-Tab Jack. See Frost, Herbert H.
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y.
Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill.
Recto Mfg. Co., Appleton & B.&O. R.R., Cincinnati, O.
Robertson-Davis Co., 361 W. Superior, Chicago, Ill.
Royalty. See Electrad, Inc.
Samson Elec. Co., Canton, Mass.
Shallcross Mfg. Co., Collingdale, Pa.
Sensistat. See D. A. Radio Co.
Workrite Radio Corp., 1838 E. 30th, Cleveland, O.
Yaxley Mfg. Co., 1528 W. Adams, Chicago, Ill.

RADIO RECTIFIER TUBES

Armstrong Electric Co., 187 Sylvan Ave., Newark, N. J.
Arcturus Radio Tube Co., 260 Sherman Ave., Newark, N. J
Audion. See De Forest Radio Co.
Cable Radio Tube Corp., 80 N. Ninth, Brooklyn, N. Y.
Ceco Mfg. Co., 1200 Eddy, Providence, R. I.
Robertson-Davis Co., 363 W. Superior, Chicago, Ill.
Cunningham, Inc., E. T., 270 Seventh Ave., New York, N. Y
Daven Co., 158 Summit, Newark, N. J.
DeForest Radio Co., Passaic, N. J.
Diamond Electric Co., Newark, N. J.
Diamond Vacuum Products Co., 4053 Diversey Ave., Chicago
Diatron. See Diamond Vacuum Products Co.
Eveready Raytheon. See National Carbon Co.
Gold Seal Electrical Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Hygrade Lamp Co., Salem, Mass.
Hytron Corp., Salem, Mass.
Jaeger Research Laboratories, 230 Park Ave., Weehawken, N. J.
Ken-Rad Tube & Lamp Corp., Owensboro, Ky.
National Carbon Co., Thompson Ave., Long Island City, N.Y.
National Union Radio Corp., 400 Madison Ave., New York.
Neptron. See Hygrade Lamp Co.
Paramount Mfg. Co., 79 Orange, Newark, N. J.
Pentode. See Ceco Mfg. Co.
Perryman Electric Co., 4901 Hudson Blvd., North Bergen. N. J.
Radio-Victor Corp. of America, 233 Broadway, New York
Schiller, Inc., J. A., 500 Chancellor Ave., Irvington, N. J.
Specialty Appliance Co., 6611 Euclid Ave., Cleveland, Ohio.
Sylvania Products Co., Emporium, Pa.
Van Horne Tube Co., 230 Center, Franklin, Ohio.

RADIO TRANSFORMERS. See Radio Circuit Components
RADIO TUBE BASE BRANDERS. See Engraving Radio Panel.
RADIO TUBE BASES. See Radio Molded Parts.
RADIO TUBE BULBS (Unfinished). See Bulbs, Glass

RADIO TUBE PARTS

Filament Hooks, Mesh Plates, Special Bolts & Nuts, Stampings, etc.
Goat Radio Tube Parts, Inc., 33 35th, Brooklyn, N. Y (Screens.)
Juno Fasteners, Inc., Hillside, N. J.
Newark Plate Laboratories, 228 Jolliff Ave., Newark, N. J (Mesh Plates.)
Newark Wire Cloth Co., 351 Verona Ave., Newark, N. J (Screens).

RADIUM POWDER AND PAINT

Radium Dial Co., 3552 Forbes, Pittsburgh, Pa.
Undark. See United States Radium Corp.
United States Radium Corp., 535 Pearl, New York, N. Y.

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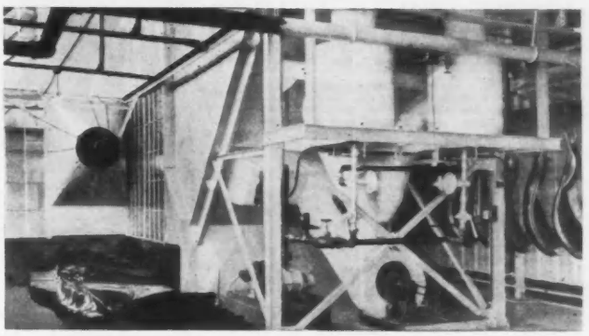

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READING LAMP BASES. See Bases, Reading Lamp.
REAMERS, Pipe. See Stocks, Dies and Reamers.
RECEPTACLES, Lamp. See Sockets and Receptacles

RECEPTACLES, Plug, Heavy Duty

KEY

Battery Charging ..... See B
Floor Boxes ..... See F
Welding ..... See W
Machine Tool ..... See W
Watertight, Marine, Mine ..... See M
Car Trailer Connection ..... See C
Extension ..... See E

A. B. C. See Andersen Mfg. Co.
Adam Electric Co., Frank, St. Louis, Mo. F
Adapti Co., 2906 E. 72nd, Cleveland, O. F
Anderson Mfg. Co., Albert & J. M., 289 A Boston, Mass. B W M E
Appleton Elec. Co., 1703 Wellington Ave., Chicago, Ill. M
Arktite. See Crouse-Hinds Co.
Arnessen Electric Co., 13 Water, New York M
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. F B W
Auth Electrical Specialty Co., 422 E. 53rd, New York, N. Y. B
Benjamin Elec. Mfg. Co., Des Plaines, Ill. F W M
Bryant Elec. Co., 1421 State, Bridgeport, Conn. (Also Range Type.) W
Campbell. See Steel City Elec. Co.
Cannon Elec. Development Co., 4210 West Ave., 53, Los Angeles, Cal. F
C. E. M. Co. See Conn. Elec. Mfg. Co.
C. H. See Cutler-Hammer Mfg. Co.
Cirele F Mfg. Co., Trenton, N. J. M
Conduletto. See Crouse-Hinds Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn. F
Cory & Son, Chas., 183 Varick, New York M
Crouse-Hinds Co., Syracuse, N. Y. B W
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. F
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa. C
Fielding. See Stanley & Patterson.
Fountain's. See Jenkins Mfg. Co.
Fullman Mfg. Co., Latrobe, Pa. F M
Fullman. See Steel City Elec. Co.
General Elec. Co., Merchandise Dept., Bridgeport, Conn. B
Gleason & Co., J. L., 241 Franklin, Boston, Mass. B
Groundsafe. See Novelty Electric Co.
H. & H. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. B W
Hessel Co., W. F., 76 Greenwich, New York, N. Y. W M B
Hubbell, Inc., Harvey, Bridgeport, Conn. (Also Range Type.) B W
Indestructible. See Kliegl Bros. Universal.
Jenkins Mfg. Co., Bloomfield, N. J. B
Kliegl Bros. Universal Elec. Stage Lighting Co., 321 W. 50th, New York, N. Y. F B W
Latrobe. See Fullman Mfg. Co.
Lexington Electric Products Co., 12 Chapel, Newark, N. J. C
Loeffelholz & Co., Milwaukee, Wis. M
Major Equipment Co., 4603 Fullerton Ave., Chicago, Ill. M
Neco. See Novelty Elec. Co.
NePage McKenny Co., 804 Sixth Ave., S. Seattle, Wash. F
Novelty Elec. Co., Tenth & Cherry Sts., Philadelphia, Pa. C
Ostrander Elect. Works, W. B., 911 Atlantic Ave., Brooklyn, N. Y.
Perkins. See Bryant Elec. Co.
Porto. See Hessel Co., W. F.
Preset. See Walker Bros. Co.
Pyle National Co., 1334 N. Kostner Ave., Chicago, Ill. W M C
Quadrangle Mfg. Co., 32 S. Peoria, Chicago, Ill. (Combination wall bracket and convenience outlet.)
Raleo Mfg. Co., 123 N. Albany Ave., Chicago, Ill.
Russell & Stoll Co., 53 Rose, New York F B W M
Square D Co., Detroit, Mich. W
Stanley & Patterson, 150 Varick, New York, N. Y. F
Steel City Elec. Co., 1207 Columbus Ave., Pittsburgh, Pa. F
Thomas & Betts Co., 15 Park Place, New York, N. Y. F
V. V. Fittings Co., 711 Cherry, Philadelphia, Pa. M
Walker Bros., 12 E. 41st St., New York, N. Y. F
Weldomatic. See Westinghouse Elec. & Mfg. Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. F B W M
Yale. See Electric Products Co.

RECORDERS, Elapsed Time. See Indicators, Operation
REDUCERS, Socket. See Socket Reducers.
REFLECTOR LENSES. See Lenses.

REFLECTORS, Chromium Plated, Metal

Aga Auto Lamp Co., Amesbury, Mass.

REFLECTORS, Porcelain Enameled, Steel

ABolite Reflector Co., West Lafayette, Ohio.
Benjamin Elec. Mfg. Co., Des Plaines (Chicago Suburb), Ill.
Dunlap Co., John, Hammond & Gregg, Carnegie, Pa.
Duratach. See Wheeler Reflector Co.
Durex. See Wheeler Reflector Co.
Federal Electric Co., 8700 S. State, Chicago, Ill.
Goodlites. See Goodrich Elec. Co.
Goodrich Elec. Co., 2935 N. Oakley Ave., Chicago, Ill.
Isolux. See Wheeler Reflector Co.
Jumbo. See Quadrangle Mfg. Co.
Marbelite Art Products Co., 1[illegible] N. Robey, Chicago, Ill.
Monk, H. E., 18 Warren, New York, N. Y.
Multi Elect. Mfg. Co., 210 N. Ogden Ave., Chicago, Ill.
Oamaco. See Overbaugh & Ayers.
Overbaugh & Ayers Mfg. Co., 411 S. Clinton, Chicago, Ill.
Para Steel. See Wheeler Reflector Co.
Perfection. See Tindall & White.
Quad. See Quadrangle Mfg. Co.
Quadrangle Mfg. Co., 32 S. Peoria, Chicago, Ill.
Reliability. See ABolite Reflectors Co.
Richardson Reflector Co., 16 Hudson, New York, N. Y.
Sturdox. See Benjamin Elec. Mfg. Co.
Tindall & White, 23 W. 60th, New York, N. Y.
Vaporlux. See Wheeler Reflector Co.
Westinghouse Elec. & Mfg. Co., South Bend, Ind.
Wheeler Reflector Co., 275 Congress, Boston, Mass.

REFRACTORIES, Porcelain. See Cores Resistance Coil.
REFRIGERANTS. See Chemicals, Refrigeration.
REFRIGERATION CHEMICALS. See Chemicals, Refrigeration.

REFRIGERATOR CABINETS

Alaska Refrigerator Co., Muskegon, Mich.
Arlington Refrigerator Co., Arlington, Vt.
Baldwin Refrigerator Co., Burlington, Vt.
Belding-Hall ElectrICE Corp., Belding, Mich.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bohn Refrigerator Co., 1340 University Ave., St. Paul, Minn.
Cavalier. See Tennessee Furniture Co.
Champion Refrigerator Co., 206 Lexington Ave., New York
Crystal Refrigerator Co., Fremont, Neb.
Crysteel. See Benjamin Elec. Mfg. Co.
Dry-Air. See Baldwin Refrigerator Co.
Eddy & Sons Co., D., 336 Adams, Boston, Mass.
Erie Art Metal Co. & Erie Metal Furniture Co., Erie, Pa
General Necessities Corp., General Necessities Bldg., Detroit, Mich.
Glockler Co., Bernard, 1627 Penn Ave., Pittsburgh, Pa.
Harder Refrigerator Corp., Cobleskill, N. Y.
Heintz Mfg. Co., Front & Olney Aves., Philadelphia, Pa.
Heinz & Munschauer, Superior and Randall, Buffalo, N. Y.
Herrick Refrigerator Co., 1893 River, Waterloo, Iowa.
Hibbard Cabinets, Inc., 6504 Euclid Ave., Cleveland, O
Holderle Bros., Inc., 339 Exchange, Rochester, N. Y.
Howe Scale Co., Rutland, Vt.
Hudson. See Harder Refrigerator Corp.
Jewett Refrigerator Co., Buffalo, N. Y.
Kingston. See Lorillard Refrigerator Co.
Kleen Kold. See Harder Refrigerator Corp.
Knox. See Erie Art Metal Co.
Leonard Refrigerator Co., Div. of Kelvinator Corp., Grand Rapids, Mich.
Liver & Co., C. B., Omaha, Neb.
Loeber Co., Henry G., 151 E. 126th, New York, N. Y. (Ice Cream Cabinet.)
Lorillard Refrigerator Co., 40 Cooper Square, New York.
Louisville Refrigerator Corp., 4460 Louisville Ave., Louisville, Ky.
Louisville Tin & Stove Co., Louisville, Ky.
Mace & Co., L. H., 55 E. 150th, New York, N. Y.
McCray Refrigerator Sales Corp., 2864 Lake St., Kendallville, Ind.
Mowatt Refrigerator Co., 25 Oak Grove, San Francisco, Cal
Niagara. See Heinz & Munschauer.
Omaha Fixture & Supply Co., 11th and Douglas, Omaha
Oreole. See Ottenheimer Bros.
Ottenheimer Bros., Baltimore, Md.
Reol. See Ottenheimer Bros.
Reolite. See Ottenheimer Bros.
Sanitor. See Bohn Refrigerator Co.
Schmidt Co., C., John and Livingston, Cincinnati, O
Seeger Refrigerator Co., Arcade and Wells Sts., St. Paul Minn.
Steeprest. See Heintz Mfg. Co.
Success Mfg. Co., Gloucester, Mass.
Syphon. See Bohn Refrigerator Co.
Tennessee Furniture Co., Chattanooga, Tenn
Vogt. See General Necessities Corp.
Ward Refrigerator Co., 6901 S. Alameda, Los Angeles, Cal
White Mountain. See Maine Mfg. Co.
White Seal. See Louisville Refrigerator Co.
REFRIGERATOR CONDENSER UNITS. See Condenser Units, Refrigerator.

REFRIGERATOR FITTINGS

Commonwealth Brass Corp., Commonwealth Ave. & G. T. R. R., Detroit, Mich.

REGULATORS, Temperature

American Radiator Co., 1807 Elmwood Ave., Buffalo, N. Y. (Mercury Switch Type.)
American Telethermo Co., 1017 Summit, Toledo, O
American Thermostat Co., 226 Jelliff Ave., Newark, N. J.
Automatic Electric Heater Co., 1524 Race, Philadelphia, Pa. (Furnace.)
Automatic Reclosing Circuit Breaker Co., Columbus, O.
Bake-O-Meter. See Cooper Oven Thermometer Co.
Boston Machine Wks. Co., 7 Willow, Lynn, Mass.
Bristol Co., Plattes Bridge & Naugatuck Rd., Waterbury, Conn.
Brown. See Electric Automatic Appliance Co.
Brown Instrument Co., Wayne & Windrim, Philadelphia
Ceaco. See Cobb Electric Appliance Co.
Cobb Electric Appliance Co., 100 Massachusetts Ave., Boston
Cooper Oven Thermometer Co., Pequabuck, Conn.
Davis & Daggett Co., 238 Dwight, Springfield, Mass.
Duo-Stat. See Raymond Co.
D. & T. Manufacturing Co., 3001 La Salle, St. Louis, Mo
Dunco. See Struthers Dunn, Inc.
Electric Automatic Appliance Co., 1748 Arapahoe, Denver, Colo.
Engelhart, Chas., 99 Chestnut, Newark, N. J.
Gifford Heat Control Systems, 1 Broadway, New York
Gold Car Htg. & Ltg. Co., 220 36th, Brooklyn, N. Y.
Hart Mfg. Co., Hartford, Conn.
Hermansen Elect. Co., 505 W. 41st, New York, N. Y.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Jewell Mfg. Co., Auburn, N. Y.
Johnson Service Co., 149 Michigan, Milwaukee, Wis.
Lockswitch. See Time-O-Stat Controls Co.
Majestic Electric Appliance Co., San Francisco, Cal.
Marvel. See American Thermostat Co.
Mercoid Corp., 4201 Belmont Ave., Chicago, Ill. (Mercury Switch.)
Minneapolis-Honeywell Regulator Co., 2753 Fourth Ave., Minneapolis, Minn.
Penn Electric Switch Co., E. 20th & Walnut Sts., Des Moines, Iowa.

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Quick Freeze. See Penn Electric Switch Co.
Ranco. See Automatic Reclosing Circuit Breaker Co.
Raymond Co., F. I., 228 N. La Salle, Chicago, Ill.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
Simplex Heat Regulator, 2938 Pillsbury Ave., Minneapolis
Snapon. See Tagliabue Mfg. Co.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Sure Fire. See Boston Machine Wks.
Tagliabue Mfg. Co., C. J., 18 83rd, Brooklyn, N. Y.
Time-O-Stat Controls Co., Elkhart, Ind.
Trent Co., Harold E., 439 N. 12th, Philadelphia, Pa.
Webster Elec. Co., Racine, Wis.
White Mfg. Co., 2362 University Ave., St. Paul, Minn.
Wilcolator Co., Newark, N. J.
Wilson-Maeulin Co., 383 Concord Ave., New York, N. Y.

REGULATORS, Voltage

American Instrument Co., 774 Girard, N. W., Washington, D. C.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Marshall Electric Co., Elkhart, Ind.
Motor. See Ward-Leonard Electric Co.
States Co., 19 New Park Ave., Hartford, Conn.
Ward Leonard Electric Co., Mount Vernon, N. Y.

RELAYS

(See also Circuit Breakers and Thermostats.)
American Brown Boveri Elec. Corp., Camden, N. J.
Automatic Switch Co., 154 Grand, New York, N. Y.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Burkaw, Inc., 30 Court, Newark, N. J.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Electric B-G Products Co., Ithaca, Mich.
Dunco. See Struthers Dunn, Inc.
General Electric Co., Schenectady, N. Y.
G-M Laboratories, Inc., Grace & Ravenswood Ave., Chicago
Grid Glow. See Westinghouse Elec. & Mfg. Co.
Leach Relay Co., 860 S. Los Angeles, Los Angeles, Cal.
McWilliams. See Electric B-G Products Co.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Signal Engineering & Mfg. Co., 154 W. 14th, New York.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wilcolator Co., Newark, N. J.
REMOTE CONTROL SWITCHES. See Switches, Remote Control.

REMOVERS, Coil

Ewing Mfg. Company, Middleport, Ohio.

RESINOID PLASTICS. See Molded Insulation.

RESISTANCE
Boxes. See Instruments, Laboratory Standard
Coil Cores. See Cores, Resistance.
Test Sets. See Instruments
Units, Radio. See Radio Circuit Components.
Units. See Units, Rods & Grids.
Wire. See Wire Bare.

RESISTORS

Hardwick, Hindle, Inc., 216 Emmett, Newark, N. J.
Ohmite Mfg. Co., 629 N. Albany Ave., Chicago, Ill.
Ward Leonard Electric Co. Mount Vernon, N. Y.

RESISTORS. See Units, Rods & Grids.
RESURFACERS, Commutator. See Stones, Commutator, also Tools, Commutator Truing.
REVOLUTION COUNTERS. See Tachometers.

RHEOSTATS.
Motor-Controlling. See Controllers, also Rheostats.
Radio. See Radio Receiver Parts.
Sewing Machine. See Controllers.

RHEOSTATS

KEY

Battery Charging ..... See B
Stage Dimming ..... See D
Meter Testing (Laboratory) ..... See L
Plating Tank ..... See P
Motion Pictures (Projector Lamp) ..... See M
Motor Starting, Field and Speed Regulating. See F

F B D P M L

Allen-Bradley Co., 493 Clinton, Milwaukee L
Beck Bros., 421 Sedgley Ave., Philadelphia, Pa. L
Biddle, James G., 1209 Arch, Philadelphia L
Brach Mfg. Corp., L. S., Newark, N. J. (Radio Battery Control.) B
Bradleystat. See Allen-Bradley Co.
Columbia Electric Mfg. Co., 1293 E. 53rd, Cleveland, O. P
Controlite. See Ward Leonard Elec. Co.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. F B D L
Economic Rheostat Switch Co., 3551 N. 5th, Philadelphia, Pa. F
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland, O. F
Electric Products Co., 1735 Clarkstone Rd., Cleveland, O. B
General Electric Co., Schenectady, N. Y. F L
Hanson-Van Winkle-Munning Co., Matawan, N. J. P
Holzmuller, C. J., 1108 Howard, San Francisco, Cal. D
Kliegl Bros. Universal Elec. Stage Lighting Co., 321 W. 50th, New York, N. Y. D M
Knoeller Elec. Co., De Pere, Wis. F
National Elec. Controller Co., 5315 Ravenswood Ave., Chicago. F B D M L
Optimus. See Hanson-Van Winkle-Munning Co.
New York, N. Y. M
Schaefer Bros. Co., 1059 W. 11th, Chicago. F B D M
Simplicity. See Cutler-Hammer Mfg. Co.

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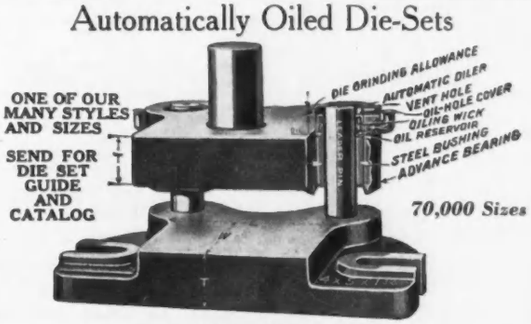

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Turbo Oil Tubing contains NO NITRO CELLULOSE COMPOUNDS and is therefore SLOW BURNING, and has HIGH DIELECTRIC STRENGTH.

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Universal. See Ward Leonard Elec. Co.
Vitrohm. See Ward Leonard Elec. Co.
Ward Leonard Elec. Co., Mt. Vernon, N. Y. . . . . F . . D . . M . .
Wotton. See Electric Products Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. . . . . F . . . . . M
RINGS Seal. See Packing.

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Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
American Brass Co., Waterbury, Conn.
Blake & Johnson Co., 1497 Thomaston Ave. (Waterville), Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Rivet & Specialty Co., 1830 S. 54th, Chicago, Ill.
Hassall, Inc., John, 402 Oakland, Brooklyn, N. Y.
Hungerford Brass & Copper Co., Div. of The Chase Brass Companies, Inc., 88 Lafayette, New York, N. Y.
Manufacturers Belt Hook Co., 1315 W. Congress, Chicago, Ill.
Nelson Rivet Co., Taunton, Mass.
Stimpson Co., Edwin B., 70 Franklin Ave., Brooklyn, N. Y.
Thomson Mfg. Co., Judson L., Waltham, Mass.
Tubular Rivet & Stud Co., 87 Lincoln, Boston, Mass.
Waterbury Brass Goods Co., Waterbury, Conn.
Wright & Corson Mfg. Co., Bridgeport, Conn.
RODS, Resistance. See Units, Rods and Grids.
ROLLER BEARINGS. See Bearings, Ball and Roller.

ROLLS, Coil Flattening
Columbia Machine Works & Malleable Iron Co., 263 Chestnut, Brooklyn, N. Y.
RUBBER BELTS. See Belts, Rubber.

RUBBER, Hard
Hard Rubber, Ebonite, Vulcanite.
Aetna Rubber Co., Ashtabula, O.
American Hard Rubber Co., 11 Mercer, New York, N. Y.
Connecticut Hard Rubber Co., West Haven, Conn.
Goodrich Rubber Co., B. F., Akron, O.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Luzerne Rubber Co., Muirhead, near Dewey, Trenton, N. J.
Mahoganite. See American Hard Rubber Co.
New York Hard Rubber Turning Co., 213 Centre, New York.
Panelyte Corp., Lincoln Bldg., New York, N. Y.
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Stokes Rubber Co., Jos., Trenton, N. J.
Superior Hard Rubber Co., Butler, N. J.
United States Rubber Co., 1790 Broadway, New York, N. Y.
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Vulco Panels. See Vulcanized Rubber Co.

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RUBBER, SEMI-HARD. See Rubber Mechanical Goods

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RUST PROOFING. See Plating & Finishing.
SAL AMMONIAC. See Chemicals, Battery.
SALTS, Battery. See Chemicals, Battery.
SATURATING TANKS. See Wire Manufacturing Machines
SCREW SHELLS, Socket. See Shells, Screw Socket.

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American Metal Wks., 4855 Stenton Ave., Philadelphia, Pa.
Arrow Automatic Products Corp., 27 Vestry, New York.
Barnes Co., Wallace, Bristol, Conn.
Belco. See Bell Co., David.
Bell Co., David, 1555 Fillmore Ave., Buffalo, N. Y. (Special Parts.)
Blake & Johnson Co., 1497 Thomaston Ave., Waterville.
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Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Brighton Screw & Mfg. Co., 1456 Harrison Ave., Cincinnati, O.
Cameron Elecl. Mfg. Co., Ansonia, Conn.
Chapman Machine Co., Terryville, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Colonial-Premier Co., 229 W. Ohio, Chicago, Ill.
Continental-Diamond Fibre Co., Newark, Del.
Corbin Screw Corp., 226 High, New Britain, Conn.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
Faries Mfg. Co., Decatur, Ill.
Froiland Chain & Mfg. Co., Springfield, Mass.
Great Western Mfg. Co., La Porte, Ind.
Hanson, Einar B., 17 Hermon, Worcester, Mass.
Hartford Machine Screw Co., 478 Capitol Ave., Hartford, Conn.
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Hubbell, Inc., Harvey, Bridgeport, Conn.
Humason Mfg. Co., Forestville, Conn.
Interstate Products Corp., 503 Mulberry, Newark, N. J.
Linden & Co., 891 Broad, Providence, R. I.
Mattatuck Mfg. Co., Waterbury, Conn.
Meisel Press Mfg. Co., 944 Dorchester Ave., Boston, Mass.
National Acme Co., 170 E. 131st, Cleveland, O.
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Parent Machine & Screw Co., 50 Canal, Salem, Mass.
Peck Spring Co., Plainville, Conn.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn
Progressive Mfg. Co., Torrington, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Screw Machine Products Corp., Providence, R. I.
Shimer & Sons, Samuel J., Milton, Pa.
Steiner & Co., 297 Washington, Newark, N. J.
Thomaston Mfg. Corp., Thomaston, Conn.
Walden Tool & Metal Mfg. Co., 3 Oxford, New Haven, Conn.
Watkins Co., D. M., 270 Pine, Providence, R. I.
Waterbury Brass Goods Corp., Waterbury, Conn.
Wilmington Fibre Specialty Co., Wilmington Del.
Wright Machine Co., 79 Armory, Worcester, Mass.

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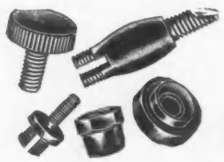
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Hartford Machine Screw Co., Hartford, Conn.

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Parker-Kalon Corp., Dept. K., 190 Varick, New York, N. Y.

SCREWS, Machine
Blake & Johnson Co., 1497 Thomaston Ave. (Waterville), Waterbury, Conn.
Chicago Nut Mfg. Co., 2513 Cullerton, Chicago, Ill.
Clark Metal Products, Inc., 490 Hancock Ave., Bridgeport, Conn.
Elco Tool & Screw Corp., 1818 Broadway, Rockford, Ill.
Hassall, Inc., John, 402 Oakland, Brooklyn, N. Y.
Hubbell, Inc., Harvey, Bridgeport, Conn.
New England Screw Co., Dept. A, 44 Farnsworth, Boston.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Progressive Mfg. Co., Torrington, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Screw Machine Products Corp., Providence, R. I.
Strong, Carlisle & Hammond, 1392 W Third, Cleveland, O
United Screw & Bolt Corp., 2713 Cullerton, Chicago, Ill.

SCREWS, Machine (Cut Thread)
American Screw Co., Providence, R. I.

SECOHMMETERS. See Instruments, Laboratory Standard
SEGMENTS. See Discs, Armature.

SEPARATORS, Storage Battery
Campbell Elec. Co., Kansas City, Mo.
Carlile & Doughty, 2530 N. Broad, Philadelphia, Pa.
Chattanooga Battery Box Co., Chattanooga, Tenn.
Certified. See Ermet Products Co.
Ermet Products Co., Sherman Drive & 16th, Indianapolis, Ind. (Wood.)
Estes & Sons, E. B., 25 Vanderbilt Ave., New York. (Wood.)
Indianapolis Box & Separator Co., 2101 Yandes, Indianapolis, Ind. (Wood.)
Indianapolis Mfg. Co., Indianapolis, Ind.
Inseco. See Indianapolis Box & Separator Co.
Link & Henrick, Inc., 555 W. 52nd, New York, N. Y
Red Band. See Indianapolis Mfg. Co.
Stewart Mfg. Co., Wm. E., 14th & Elm, Flint, Mich. (Wood.)
Wick Lumber Co., R., 539 W. 52nd, New York. (Wood.)

SHADES
Aluminum. See Shades, Metallic.
Asbestos. See Shades, Fabric.
Bamboo. See Shades, Fabric.
Brass. See Shades, Metallic.
Cast Metal. See Shades and Domes.
Copper. See Shades Metallic.
Cretonne. See Shades, Fabric.
Leaded. See Shades and Domes.
Leather. See Shades, Fabric.
Linen. See Shades, Fabric.
Mica. See Shades, Mica.
Molded. See Molded Insulation.
Mosaic. See Shades and Domes.
Parchment. See Shades, Fabric.
Paper. See Shades, Fabric.
Silk. See Shades, Fabric.
Stamped Metal. See Shades, Metallic; also Shades and Domes.
Steel. See Shades, Metallic.
Tin. See Shades, Metallic.
Zinc. See Shades, Metallic.

SHADES, Fabric
Asbestos Cretonne, Leather, Linen, Paper, Silk, Bamboo Parchment.
Adelphi Lamp Shade Co., 242 Fifth Ave., New York. (Silk.)
Admiration Lamp Shade Co., 160 Madison Ave., New York, N. Y. (Silk.)
Andrews Co., C. M., 33 E. 30th, New York, N. Y. (Silk.)
Art Lamp Shade Studios, 316 Fifth Ave., New York, N. Y.
Audrey Art Shade Studios, 105 Thatford Ave., Brooklyn.
Borghese. See Hall, Chas.
Clark, H. W., 813 Fourth Ave. N., Troy, N. Y. (Parchment.)
Daiger Co., Charles V., 76 Essex, Boston, Mass. (Silk.)
Eastern Art Shop, 14 W. 19th, New York. (Parchment.)
Foss, Leonard R., 1338 E. 12th, Oakland, Cal. (Parchment.)
Foslite. See Foss, Leonard R.
Frostelene. See Art Lamp Shade Studios.
Gibson Art Co., 223 W. Fourth, Cincinnati, Ohio. (Paper.)
Hall, Chas., 3 E. 40th, New York, N. Y. (Paper Parchment.)
Hanson Co., Paul, 15 E. 26th, New York, N. Y. (Chintz.)
Harris Mfg. Co., 122 University Place, New York, N. Y. (Parchment.)
Herco Art Mfg. Co., Meriden, Conn.
Idealite Lamp Shade Mfg. Co., 4955 Fremont, Jersey City, N. J. (Parchment.)
Kapa Shell. See Wardwell, E. H.
Kerwin. See Hall, Chas.
Kno-Glair. See Hamilton, M. E.
Lamb Bros. & Greene Corp., Napannee, Ind. (Silk.)
Luxrite. See John H. St. John.
Monarch Lamp & Shade Co., 210 N. Second, Philadelphia, Pa. (Silk.)
Morimura Bros., 58 W. 23rd, New York. (Bamboo, Silk, Cretonne.)
Parchment Novelty Co., 87 E. 10th, New York, N. Y. (Parchment.)
Patent Lamp Shade Co., 1361 Frankford Ave., Philadelphia
Peerless Lamp Shade Mfg. Co., 114 E. 25th, N. Y. (Silk.)
R. D. Electric Co., 2425 Spy Run, Fort Wayne, Ind. (Linen and Silk.)
Reuter, Wm., 33 W. 34th, New York, N. Y. (Silk.)
Rosita Studio, 10 W. 28th, New York, N. Y. (Parchment and Leatherette.)
Sanderson's Art Co., Milwaukee, Wis. (Parchment.)
Springel & Son, A., 26 S. 3rd, Philadelphia, Pa.

St. John, John H., 1298 Atlantic Ave., Brooklyn, N. Y. (Silk.)
Superior Lamp Shade Manufacturers, 72 Madison Ave., New York, N. Y. (Silk.)
Tombs Studios, Wm. H., 172 Pennsylvania Ave., Newark, N. J. (Parchment Paper.)
Trio Mfg. Co., 610 N. American, Philadelphia, Pa. (Silk.)
Utility Shade Co., Tenafly, N. J.
Vogue Lamp & Shade Co., 130 W. 17th, New York, N. Y. (Parchment.)
Wardwell, E. H., 11 E. 36th, New York, N. Y.

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Badanes Mfg. Co., 62 Greene, New York, N. Y.
Bayley & Sons, 105 Vanderveer, Brooklyn, N. Y.
Mutual Sunset Lamp Co., 21 E. Houston, New York, N. Y.
Western Art Glass Shade Works, 101 Turk, San Francisco.
SHADES, FACTORY WINDOW. See Window Shades, Factory.

SHADES, Metallic
Tin, Aluminum, Brass, Copper, Zinc, Steel.
A. A. Elec. Mfg. Co., Bridgeport, Conn. (Sole selling agent, Harry Pickhardt, 17 W. 60th, New York, N. Y.)
Faries Mfg. Co., Decatur, Ill. (Brass, Aluminum, Tin Copper.)
Frink Co., Inc., 389 Lexington Ave., New York, N. Y. (Aluminum, Brass, Zinc, Iron, Steel.)
Hubbell, Inc., Harvey, Bridgeport, Conn. (Aluminum, Brass, Steel, Tin.)
Miller Co., Meriden, Conn.
Monk, H. R., 18 Warren, New York, N. Y. (Tin, Aluminum, Brass, Copper, Zinc & Steel).
Oamco. See Overbaugh & Ayres Mfg. Co.
Overbaugh & Ayres Mfg. Co., 411 S. Clinton, Chicago, Ill.
Richardson Reflector Co., 16 Hudson, New York, N. Y.
Western Reflector Co., 1221 W. Madison, Chicago. (Tin.)

SHADES, Mica
Hirsch Mica Co., 1087 Flushing Ave., Brooklyn, N. Y.
Huse-Liberty Mica Co., 73 Long Wharf, Boston, Mass.
Kant-Krack. See Huse Liberty Mica Co.
Mica Insulator Co., 200 Varick, New York, N. Y.
Sterra Mica Co., 11 Park Place, New York, N. Y.
Tar Heel Mica Co., Plumtree, N. C.
Tarmilite. See Tar Heel Mica Co.

SHAFT COUPLINGS. See Couplings, Shaft.
SHAFTS, Flexible. See Tubing, Flexible Metallic.
SHEARS, Metal Cutting. See Shears, Power.
SHEARS, Rotary. See Shears, Power.

SHEARS, Insulation
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.

SHEARS, Power
Natgara Machine & Tool Wks., 637 Northland Ave., Buffalo.

SHEET STEEL CABINETS. See Cabinets, Sheet Steel.

SHELLS, Screw Socket
Chase Brass & Copper Co., Waterbury, Conn.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass Inc., 820 Orleans, Chicago, Ill.
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
Patton-MacGuyer Co., Providence, R. I.
Risdon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Torrington Mfg. Co., Torrington, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.

SHUNTS, Instruments. See Instruments, Laboratory Standard.

SIGN FLASHERS. See Flashers, Sign.
SIGN LETTER LENSES. See Lenses.

SILICA
Ottawa Silica Co., Ottawa, Ill. "Flint Shot."

SILK, Cloth Insulated. See Cloth & Paper.
Shades. See Shades, Fabric.
Tape. See Tape.
Thread. See Yarn, etc.

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General Plate Co., Attleboro, Mass.
Gilby Wire Co., Riverside Ave., Newark, N. J.
Handy & Harman, 57 William, New York, N. Y.
National-Harris Wire Co., Newark, N. J.
Wilco. See Wilson Co., H. A.
Wilson Co., H. A., Newark, N. J.

SILVER SOLDER. See Solder, Silver.

SINE WAVE OSCILLATORS. See Instruments, Laboratory Standard.

SIGN ELECTRODES, Gas. See Electrodes for Gas Signs
SKINNERS WIRE. See Scrapers.
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SLEEVE-BEARINGS. See Bearings and Bushings.
SLEEVING, Cotton. See Tape, Cotton.
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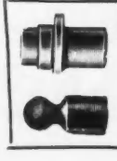
Binghamton Flexible Shaft Co., Binghamton, N. Y.
Burton-Rogers Co., 857 Boylston, Boston, Mass.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
General Electric Co., Schenectady, N. Y.
Hobart Bros. Co., Troy, Ohio.
Hullhorst Micro Tool Co., 3242G Monroe, Toledo, O.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore Ill.
Imperial. See Martindale Elec. Co.
Martindale Electric Co., 1262 W. Fourth, Cleveland, Ohio.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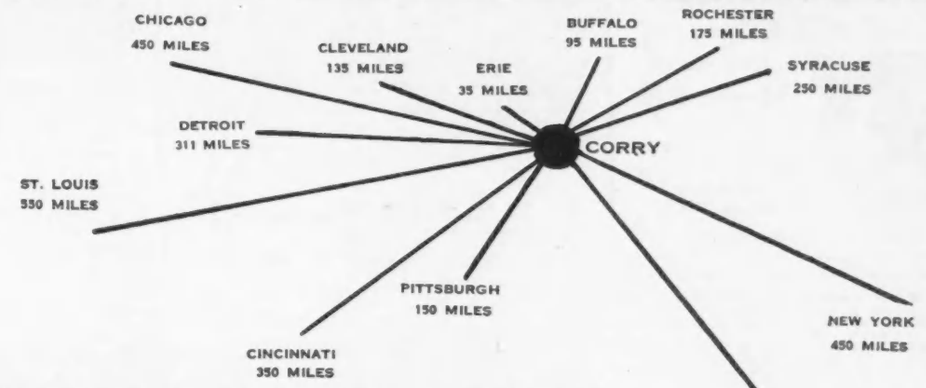

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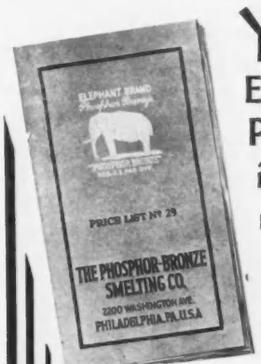

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South Bend Lathe Works, 425 E. Madison, South Bend, Ind
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill
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SNAP SWITCHES. See Switches, Snap

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Westinghouse Elec & Mfg. Co., East Pittsburgh, Pa.

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SOCKET SHELLS. See Shells, Screw Socket.
SOCKETS, Flashing. See Flashers, Sign.

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Bryant Electric Co., Bridgeport, Conn.
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Easylite. See Rittenhouse Co., A. E.
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Gripper. See Wittenberg Bros.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. (Metal Pull Tassel.)
Hubbell, Inc., Harvey, Bridgeport, Conn. (Links and Acorns. Metal Pull Tassels.)
Paiste. See Hart & Hegeman Mfg. Co.
Pass & Seymour, Inc., Div. H, Solvay Sta., Syracuse, N. Y. (Pull Chain Tassel.)
P. & S. See Pass & Seymour, Inc.
Rittenhouse Co., A. E., Honeoye Falls, N. Y. (Sole Selling Agent. Hatheway & Co., 16 Hudson, New York, N. Y.)
Rodale Mfg. Co., Emaus, Pa.
Royal. See Sears, Henry D.
Scovil Mfg. Co., Waterbury, Conn. (Acorn.)
Sears, Henry D., 50 Boylston, Boston, Mass.
Waterbury Brass Goods Co., Waterbury, Conn. (Acorns.)
Weber. See Sears, Henry D.
Wittenberg Bros., 60 Shipman, Newark, N. J. Links. Insu-

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Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Cra-del-Ite. See Sears, Henry D.
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Electric Co., 94 Allyn, Hartford, Conn.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hart & Hegaman Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn.
Morse Co., Frank W., 291 Congress, Boston, Mass
Pass & Seymour, Inc., Div. H, Solvay Sta., Syracuse, N. Y.
Troop Co., M., 524 Broadway, New York, N. Y.
Rodale Mfg. Co., Emaus, Pa.
Sears, Henry D., 50 Boylston, Boston, Mass.
SOCKETS, Radio. See Radio Receiver Parts.

SOCKETS AND RECEPTACLES, Lamp
Bases other than Standard (or Medium) are indicated as follows: Megul, M; Candelabra (or Miniature), C.

Key	See K
Composition	See W
Metal Shell	See B
Porcelain	See A
Pull Chain	See P
Push Through	See T
Sign Receptacles	See A

Acme Elec. & Mfg. Co., Canal & Hamilton Ave., Trenton, N. J. . . . . A
Ajax Elec. Specialty Co., 1926 Chestnut, St. Louis, Mo. . . . . W
Alabax. See Arrow Elec. Co.
Alcor Mfg. Co., 4605 W. Madison, Chicago, Ill. C
Appleton Electric Co., 1703 Wellington
Appleton Electric Co., 1730 Wellington Ave., Chicago, Ill. . . . . A
Armstrong & White, 9th and Liberty Ave., Pittsburgh, Pa. . . . . A
Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford. Conn. M C K T P B A
Arrogrip. See Arrow Elec. Co.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. . . . . C . . . P B .
Best See United States Elec. Mfg. Corp
Bryant Elec. Co., Bridgeport . . . M C K T P B A
C-H See Cutler-Hammer Mfg. Co.
Circle F Mfg. Co., Trenton, N. J. . . . M . . K T P B A

Circle T. See Trumbull Elec. Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. . . . . .
Connecticut Elec. Mfg. Co., Bridgeport, Conn. . . . . M . . K T . . B A
Crouse-Hinds Co., Syracuse, N. Y. . . . A W . . . . . .
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. . . . . K T . . B A
Durex. See Wheeler Reflector Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn
Far-Go Elec. Mfg. Co., 368 Broome, New York, N. Y. . . . . C . . . . . .
Federal Electric Co., 6700 S. State, Chicago, Ill. . . . . A
Flute. See Pass & Seymour.
Flutelier. See Pass & Seymour.
Frink Co., Inc., 369 Lexington Ave., New York, N. Y. . . . . M C . . . . . B . .
Gaynor Elec. Co., Section W-329, Stratford, Conn. . . . . A
General Elec. Co., Merchandise Dept., Bridgeport, Conn. . . . . M C K T P B A
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. . . . . M C K T P B A
Harter. See Multi Elecl. Mfg. Co.
Hoosick Falls Radio & Elec'l Parts Mfg. Co., Hoosick Falls, N. Y. . . . . W . . . . . .
Horan Co., E. S., 550 Monroe, Carlstadt, N. J. . . . . A
Hubbell, Inc., Harvey, Bridgeport, Conn. M C K T P B A
H. & H. See Hart & Hegeman.
I-D-A. See Watson Mfg. Co., J. E.
K-E Cleat Receptacle. See Kirkman.
Leader. See Levitton Mfg. Co.
Leiser & Co., W. A., 1607 Sansom, Philadelphia, Pa. . . . . A
Levitton Mfg. Co., 236 Greenpoint Ave., Brooklyn, N. Y. . . . . M C K . . P B A
Levolier. See McGill Mfg. Co.
Liberty Bell. See Hart & Hegeman.
Locat-A-Catch. See Connecticut.
McGill Mfg. Co., Valparaiso, Ind. . . . . P B A
Multi Elec'l Mfg. Co., 1840 W. 14th, Chicago, Ill. . . . . A
Multilok. See Circle F Mfg. Co.
National Bearing Metal Corp., Div. More-Jones Brass & Metal Co., 4030 Manchester Ave., St. Louis, Mo.
Newgard. See Multi Elec'l Mfg. Co.
New Wrinkle. See Bryant Elec.
Neark. See Colt's Patent Fire Arms.
P & S. See Pass & Seymour.
Pass & Seymour, Div. H, Solvay Sta., Syracuse, N. Y. . . . . M C K T P B A
Paulding, John L., New Bedford, Mass. . . . . B A
Perkins. See Bryant Elec. Co.
Porcelain Products, Inc., Findlay, O. . . . . A
Quick Catch See Hubbell, Inc.
Royal. See Sears, Henry D.
Ryan Appliance Co., 117 Mulberry, Trenton, N. J. . . . . W . . . . . A
Sears, Henry D., 50 Boylston, Boston M C K T P B A
Security. See Circle F Mfg. Co.
Shurlock. See Pass & Seymour.
Siemen Co., Bridgeport, Conn. . . . . .
Taplet Mfg. Co., 3709 Pewelton Ave., Philadelphia, Pa. . . . . A
Titan. See Bryant Elec. Co.
Trumbull Elec. Mfg. Co., Plainville, Conn. . . . . A
Union Insul. Co., Parkersburg, W. Va. . . . . .
United States Elec. Mfg. Corp., 222 W. 14th, New York, N. Y. . . . . P . . B . . W
U. S. Electric Co., 18 Chambers, Trenton, N. J. . . . . A
Walco. See Leiser & Co., W. A.
Weber. See Sears, Henry D.
Wheeler Reflector Co., 275 Congress St., Boston, Mass. . . . . P . . . .
Wood Electric Co., C. D., 565 Broadway, New York. (Sign Receptacles.) . . . . . A
Woodwin. See Wood Elec. Co.
Wrinklet. See Bryant Elec. Co.

SOLDER, Aluminum
Federated Metals Co., 233 Broadway, New York, N. Y.
Lasher-Weeber Co., 261 Franklin, Boston, Mass.
Lenk Mfg. Co., 30 Merrimac, Boston, Mass.
Supreme. See Lasher-Weeber Co
Usarco. See Federated Metals Co.

SOLDER, Bar and Wire
Eagle. See Hoyt Metal Co.
Genuine A See Hoyt Metal Co.
Hoyt Metal Co., St. Louis, Mo.

SOLDER, Self-Fluxing
Dutch-Boy. See National Lead Co.
Gardiner Metal Co., 1365 W. Lake, Chicago, Ill.
Kester Solder Co., 4210 Wrightwood Ave., Chicago, Ill.
Lenk Mfg. Co., 32 Merrimac, Boston, Mass.
National Lead Co., 111 Broadway, New York, N. Y
Philadelphia Solder Co., 16th & Indiana Ave., Philadelphia, Pa.
Silva-Wares, Inc., 134 W. 29th St., New York, N. Y.
Solderall Co., 129 Sussex Ave., Newark, N. J.

SOLDER, Silver
Handy & Harman, 57 William, New York, N. Y.
Wilson Co., H. A., Newark, N. J.

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Compounds. See Soldering Compounds.
Irons See Soldering Irons
Machines See Soldering Machines. Commutator
Pots. See Melting Pots & Ladles.
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Amco. See American Solder & Flux Co.
American Solder & Flux Co., 2910 N. 16th, Philadelphia, Pa.
Armstrong Ke-Ti Products Co., 491 N. Front, Columbus, O.
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Chase Brass & Copper Co., 236 Grand, Waterbury, Conn.
Conductalute. See Technical Products Co.
Crescent. See McGill Mfg. Co.
Dielectric Mfg. Co., St. Louis, Mo.
Dunton Co., M. W., Providence, R. I.
Dutch-Brand. See Van Cleef Bros.
Eureka. See Grasselli Chemical Co.
Firth Radio Corp., 25 Beaver, New York, N. Y.
Fluxite. See Monarch Products Co.
General Elec. Co., Bridgeport, Conn. (Paste).
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Highland Electro Chemical Mfg. Co., Connellsville, Pa (Paste, Stick, Salts.)
Incomparable. See Reade Mfg. Co.
Kester Solder Co., 4210 Wrightwood Ave., Chicago, Ill
Leveridge, Inc., Chas. W., 246 Fulton, New York, N. Y
Lotan Research Corp., 6545 Euclid Ave., Cleveland, O
Luco. See Lukens Metal Co.
Lukens Metal Co., T. F., 1105 Fairmount Ave., Philadelphia, Pa.
McGill Mfg. Co., Valparaiso, Ind. Fluid.
Mitchell-Rand Mfg. Co., 19 Vesey, New York. (Paste.)
Neutral. See Dielectric Mfg. Co.
New-Idea. See Hartwig Co., Wm. J.
Nokorode. See Dunton Co., M. W.
Oakwood. See Weaver Specialty Co.
Paragon Insulating Co., 5716 Euclid Ave., Cleveland, O.
Perfecto. See Firth Radio Corp.
Pfanstiehl Chemical Co., Waukegan, Ill. Paste, Salts Sticks, Fluid, Oil, and Solid Sal Ammoniac.
Queens. See Brunner Chemical Works.
Reade Mfg. Co., 133 Hoboken Ave., Jersey City, N. J (Fluids. Salts, Paste).
Redina. See Reade Mfg. Co.
Red-Letter. See Ruby Chemical Co.
Rodale Mfg. Co., Emaus, Pa.
Rotax Mfg. Co., Bathgate Place, Newark, N. J.
Ruby Chemical Co., Columbus, O.
Ruby Fluid. See Ruby Chemical Co.
Salbrick. See American Solder & Flux Co.
Smarr & Co., Geo. W., 110 S. Ninth, St. Louis, Mo (Paste.)
Snowflake. See Grasselli Chemical Co.
Snowflake. See Highland Electro Chemical Co.
Solderine. See Central Stamping Co.
Solderite, Inc., 22 Green, Newark, N. J.
Speco. See Pfanstiehl Chemical Co.
Standard. See Grasselli Chemical Co.
Star. See McGill Mfg. Co.
Superior. See Highland Electro Chemical Co.
Technical Products Co., 2308 Main, Pittsburgh, Pa. (Paste.)
Tinol. See American Solder & Flux Co.
Van Cleef Bros., 7722 Woodlawn Ave., Chicago, Ill.
Weaver Specialty Co., 6344 Aurelia, Pittsburgh, Pa.
Yager's. See Benson Co., Alex. R.
Yankee. See Leveridge, Inc., Chas. W.

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Adroit. See Adrola Corp.
Adrola Corp., Port Jefferson, N. Y.
American Beauty. See American Elecl. Heater Co
American Elecl. Heater Co., Woodward & Burroughs Ave., Detroit, Mich.
Beardsley & Wolcott Mfg. Co., Waterbury, Conn.
Beckwith Machine Co., 402 Chestnut, Ravenna, Ohio.
Betsy Ross. See Central Flatiron Mfg. Co.
Brach Mfg. Corp., L. S., Newark, N. J.
Burnley Battery & Mfg. Co., North East, Pa.
Central Flatiron Mfg. Co., Johnson City, N. Y.
Chapman Machine Co., Terryville, Conn.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Davis Specialty Works, East Gary, Ind.
Dominion Elec'l Mfg. Co., 712 Ontario Ave., W., Minneapolis.
Dover Mfg. Co., Dover, O.
Drake Elec Wks., 3943 Lincoln Ave., Chicago, Ill.
Electrahot Mfg. Co., 525 S. 4th, Minneapolis, Minn.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland (Transformer Soldering Outfit.)
Electric Soldering Iron Co., Inc., 135 W. 17th, New York
Enco. See Electrical Necessities Corp.
Esico. See Electric Soldering Iron Co.
Everhot. See Swartzbaugh Mfg. Co.
Ever-Ready. See Gold Seal Elec. Co.
General Electric Co., Schenectady, N. Y.
Gold Seal Elecl. Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Industrial. See Permway Mfg. Co.
Jiffy See Koch & Co., Paul W
King See Electric Heat Control Co.
Koch Co., Paul W., 19 S. Wells, Chicago. (Solder Dipper.)
Landers, Frary & Clark, New Britain, Conn.
Lenk Mfg. Co., 30 Merrimac, Boston, Mass.
Lotan. See Simplex Flux & Solder Co. of America.
Lucifer. See Jones Point Tool & Elec. Co.
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Queen Quality. See Watlow Elec. Mfg. Co.
Quick-Hot. See Mote-Ray Mfg. Co.
Regular. See National Specialties Co.
Reliance. See Landers, Frary & Clark.
Samson-United Corp., Probert, Rochester, N. Y.
Simplex Div. of Edison General Elec. Appliance Co., Inc., 5600 W. Taylor, Chicago, Ill.
Simplex Flux & Solder Co. of America, 1965 E. 66th, Cleveland, O.
Sta-Warm. See Beckwith Machine Co.
Superior Elec. Products Corp., 1309 S. 13th, St. Louis, Mo.
Swartzbaugh Mfg. Co., 1501 W. Bancroft, Toledo, O.
Torrid. See Beardsley & Wolcott Mfg. Co.
Trent, Harold E., 439 N. Twelfth, Philadelphia, Pa.
Varick Elec. Mfg. Co., 18 E. 21st St., New York, N. Y.
Vulcan Elec. Heating Co., 225 Varick, New York, N. Y.
Wasge Elec. Co., 5100 W. Ravenswood Ave., Chicago, Ill.
Ward Mfg. Co., 937 Wellington Ave., Chicago, Ill.
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SOLENOIDS. See Coils
SOLVENTS & REDUCERS, VARNISH. See Paint, Varnish, Lacquer.
SPAGHETTI. See Tubing, Varnished Fabric.
SPEED CHANGING UNITS. See Gears (Speed Changing Units).
SPEED INDICATORS. See Tachometers.
SPEED REDUCERS. See Gears, Speed Changing Units
SPOOLING MACHINES, WIRE. See Wire Manufacturing Machines.

SPRAYING OUTFITS
Airmode. See Reliable Mfg. Co.
Airway. See Binks Spray Equip. Co.
Atomister Corp., 21 Hamilton, Rahway, N. J.
Beach Air Brush Co., Willard C., Second & Warren, Harrison, N. J.
Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill.
Breuer Electric Mfg. Co., 852 Blackhawk, Chicago, Ill.
De Vilbiss Co., 3750 Detroit Ave., Toledo, Ohio.
Eclipse Air Brush Co., 1355 Shield Ave., Newark, N. J.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Electric Sprayit Co., 320 E. Colfax Ave., South Bend, Ind.
Eureka Sprayers, Inc., 87-28 130th, Richmond Hill, N. Y.
Gast Mfg. Corp., Bridgman, Mich.
Globe Mfg. Co., Battle Creek, Mich.
Hobart Mfg. Co., Simpson & Penn Sts., Troy, Ohio.
Hurley. See Binks Mfg. Co.
Ideal Air Brush Mfg. Co., 270 Lafayette, New York, N. Y.
Kellogg Mfg. Co., 97 Humboldt, Rochester, N. Y.
Koch Bros. Mfg. Co., 2339 Nelson, Chicago, Ill.
K B. See Koch Bros. Mfg. Co.
Metal Specialties Mfg. Co., 338 N. Kedzie Ave., Chicago.
Macleod Co., 2232 Bogen, Cincinnati, O.
Matthews Corp., W. N., 3722 Forest Park Blvd., St. Louis, Mo.
Paasche Air Brush Co., 1909 Diversey Parkway, Chicago, Ill.
Paint-O-Mister. See Atomister Corp.
Pioneer Air Compressor Co., 243 Canal, New York, N. Y.
Presto. See Metal Specialties Mfg. Co.
Reliable Mfg. Co., Dwightway & Fourth St., Berkeley, Cal.
Sharpe Mfg. Co., 1356 S. Flower, Los Angeles, Cal.
Simons Paint Spray Brush Co., 17 Maryland Ave., Dayton, O.
Simplex Spray Equipment Co., 552 W. Lake, Chicago, Ill.
Spraco, Inc., Somerville, Mass.
Spray-All. See United States Air Compressor Co.
Sprayit. See Electric Sprayit Co.
United States Air Compressor Co., 5306 Howard Ave., Cleveland, O.
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Barnes Co., Wallace, Bristol, Conn.
Barnes-Gibson-Raymond, Inc., 6400 Miller Ave., Detroit.
Cary Spring Works, Inc., 240 W. 29th St., New York, N. Y.
Cleveland Wire Spring Co., Cleveland, O.
Cook Spring Co., Ann Arbor, Mich.
Cuyahoga Spring Co., Berea Rd., Cleveland, O.
Dunbar Bros. Co., Bristol, Conn.
Eureka Tinware Mfg. Co., 135 W. 20th, New York, N. Y
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Flexo Spring Mfg., Inc., 34 South First, Brooklyn, N. Y.
Gibson Co., Wm. D., 1800 Clybourn Ave., Chicago, Ill.
Hubbard Spring Co., M. D., Pontiac, Mich.
Humason Mfg. Co., Forestville, Conn.
Hunter Pressed Steel Co., Lansdale, Pa.
Kokomo Spring Co., Kokomo, Ind.
Lee Spring Co., 34 Main, Brooklyn, N. Y.
Mattatuck Mfg. Co., Waterbury, Conn.
Miller & Van Winkle, Inc., 18 Bridge, Brooklyn, N. Y.
Newcomb Spring Corp., 234 40th, Brooklyn, N. Y.
Peck Spring Co., Plainville, Conn.
Peterson Spring Co., 1660 Beard Ave., Detroit, Mich.
Rapid Spring Co., 222 Second Ave., Pittsburgh, Pa.
Raymond Mfg. Co., Corry, Pa.
Standard Spring and Manufacturing Co., 236-42nd St. Brooklyn, N. Y.
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Yost Superior Co., Springfield, O.
Young Industries, Inc., L. A., Detroit, Mich.
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STAMPINGS, Fibre. See Fibre.
Sheet Metal. See Fixture Fittings.
Sheet Steel. See Stampings, Sheet Steel.
Small. See Stampings, Small.

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Truscon Steel Co., Youngstown, O.
United States Stamping Co., Moundsville, W. Va.

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Small Stamped Metal Parts for Electrical Devices.
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American Radio Hardware Co., 135 Grand, New York, N. Y.
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Arrow Automatic Products Corp., 27 Vestry, New York, N. Y.
Barnes Co., Wallace, Bristol, Conn.
Beaver Mfg. Co., 625 N. Third, Newark, N. J.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Bull Dog Electric Products Co., Detroit, Mich.
Chase Brass & Copper Co., Waterbury, Conn.
Cinch Mfg. Corp., 2335 W. Van Buren, Chicago, Ill.
Clarke Metal Products, Inc., 400 Hancock Ave., Bridgeport, Conn.
Detroit Metal Specialty Co., 1651 Beard, Detroit, Mich.
Diamant & Tool Mfg. Co., 401 Mulberry, Newark, N. J.
Elco Tool & Screw Corp., 1818 Broadway, Rockford, Ill.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
Faries Mfg. Co., Decatur, Ill.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
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Grammes & Sons, Inc., L. F., Allentown, Pa.
Gray Bros. Co., Piano, Ill.
Great Lakes Pressed Steel Corp., 1410 Niagara, Buffalo, N. Y.
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Humason Mfg. Co., Forestville, Conn.
Hunter Pressed Steel Co., Lansdale, Pa.
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Klein Elec. & Mfg. Co., 14½ Young, Tonawanda, N. Y.
Krischer's Mfg. Co., 255 Calyer, Brooklyn, N. Y.
Lansing Stamping Co., Lansing, Mich.
Lenz Metal Stamping Wks., J., 199 Franklin, New York
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Monowatt Electric Corp., 34 W. 40th, New York, N. Y.
Mutual. See Bull Dog Elec. Products Co.
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Premax Products, Inc., 230 Tenth, Niagara Falls, N. Y.
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Ribaysen Mfg. Co., J., 4442 Roosevelt Rd., Chicago, Ill.
Risdon Mfg. Co., Naugatuck, Conn.
Roach-Appleton Mfg. Co., 3440 N. Kimball Ave., Chicago.
Russell Mfg. Co., John M., Naugatuck, Conn.
Schollhorn Co., Wm., New Haven, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Sharples Separator Co., Riddle & Patten Ave., Westchester, Pa.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Signal Elec. Mfg. Co., Menominee, Mich.
Sons Mfg. Co., Roselle, N. J.
Steinen & Co., 297 Washington, Newark, N. J.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
United States Stamping Co., Moundsville, W. Va
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
Waterbury Brass Goods Corp., Waterbury, Conn.
Waterbury Button Co. (Elecl. Mfg. Div.), Waterbury, Conn.
Western Cartridge Co., East Alton, Ill.
Zierick Machine Wks., F. R., 68 E. 131st St., New York, N. Y.

STANDS, Armature
Columbia Machine Works & Malleable Iron Co., 263 Chestnut, Brooklyn, N. Y.
Electric Service Supplies Co., 17 & Cambria Sts., Philadelphia, Pa
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn
Peerless. See Electric Service Supplies Co.
Ridion Company, Frank, Boston, Mass.
Weidenhoff, Joseph, 4353 Roosevelt Rd., Chicago, Ill.
STARTERS, Motor. See Controllers, Motor; Switches, Remote Control; Switches, Knife; Safety; Switches, Snap (Heavy Duty).
STEATITE. See Ceres, Resistance Coil.
STEEL CASTINGS. See Castings, Steel.

STEEL for Electric Appliances
Elyria Iron & Steel Co., Elyria, O.
Ryerson & Son, Jos., 2558 W. 16th, Chicago, Ill.

STEEL, Magnet
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hercules Elec. Steel Corp., 145 Lafayette St., New York.
Ludlum Steel Co., Watervliet, N. Y.
Reed Co., Jr., David, 85 Adams, Brooklyn, N. Y.
Swedmag. See Reid Co., Jr., David.

LEE-BUILT SPRINGS
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34 Main St., Brooklyn, N.Y.

STEEL SHEETS
Agathon. See Republic Iron & Steel Co.
Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh.
Armco. See International Corp., Middletown, O.
Armelec. See Empire Steel Corp.
Cyclops Steel Co., Titusville, Pa.
Dynelec. See Empire Steel Corp.
Empire Steel Corp., Mansfield, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Follansbee Bros. Co., Third & Liberty, Pittsburgh, Pa.
Manelec. See Empire Steel Corp.
Metelec. See Empire Steel Corp.
Newport Rolling Mill Co., Newport, Ky.
Polelec. See Empire Steel Corp.
Republic Iron & Steel Co., 335 Market, Youngstown, O
Tranelec. See Empire Steel Corp.
Unilov. See Universal Steel Co.
Universal Steel Co., Bridgeville, Pa.
Wheeling Steel Corp., Wheeling, W. Va.
STEEL, STRIP. See Strip Steel.

STOCKS, Dies and Reamers
Hall-Will, Inc., Twelfth & Cranberry, Erie, Pa.
Red-E-Hall. See Hall-Will, Inc.
Toledo Pipe Threading Machine Co., 1445 Summit, Toledo, O.

STONES, Commutator
Acme. See Green Equipment Corp.
Caro. See Electric Service Supplies Co.
Cleveland Stone Co., Union Trust Bldg., Cleveland, O.
Co-operative Utilities Co., 1503 Columbia Ave., Philadelphia, Pa.
Diamond Dee. See Co-operative Utilities Co.
Electric Service Supplies Co., 17th and Cambria, Philadelphia, Pa.
Green Equipment Corp., 260 Monadnock Block, Chicago, Ill.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Electric Co.
Lombard & Co., Somerville, Mass.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.

STOOLS, Factory; Steel
Angle Steel Stool Co., Plainwell, Mich.
Chicago Wire Chair Co., 613 N. La Salle, Chicago, Ill.
Royal Metal Mfg. Co., 1140 South Michigan Ave., Chicago.

STORAGE
Battery Plates. See Plates, Storage Battery.
Battery, Separators. See Separaters.
Tools. See Tools, Storage Battery.
STRAINING MACHINES, INSULATION. See Wire Manufacturing Machines.

STRAIGHTENERS, Armature Shaft
Columbia Machine Works & Malleable Iron Co., 263 Chestnut, Brooklyn, N. Y.
STRANDING MACHINES. See Wire Manufacturing Machines.

STRIP STEEL
(Hot and Cold Roll).
Acme Steel Co., 2832 Archer Ave., Chicago, Ill. (Hot & Cold).
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill. (Cold).
Athenia Steel Co., 135 William, New York, N. Y. (Cold.)
Barnes Co., Wallace, Bristol, Conn. (Hot.)
Griffin Mfg. Co., Huron & Cherry, Erie, Pa. (Cold.)
Laclede Steel Co., Arcade Bldg., St. Louis, Mo. (Hot.)
Latrobe Electric Steel Co., Latrobe, Pa. (Hot & Cold.)
Republic Iron & Steel Co., 335 Market, Youngstown, O.
Sharon Steel Hoop Co., Sharon, Pa. (Hot.)
Stanley Wks., New Britain, Conn. (Hot & Cold.)
Steel and Tubes, Inc., Cleveland, O. (Hot & Cold.)
Superior Steel Corp., 3122 Grant Bldg., Pittsburgh, Pa. (Hot & Cold.)
Thomas Steel Co., Warren, Ohio.
West Leechburg Steel Co., Farmers Bank Bldg., Pittsburgh, Pa. (Hot & Cold.)

STRIPPERS, Wire
Acme. See A. Laubscher.
Arlen Engineering Co., 115 Brown, Milwaukee, Wis (Cutting, Stripping and Measuring).
Austin Co., M. B., 108 S. Desplaines, Chicago, Ill.
Carlander, Henry, 508 W. 146th, New York, N. Y.
Colonial-Premier Co., 229 W. Ohio, Chicago, Ill.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
E-Z. See Pyramid Products Co.
F. F. See France Mfg. Co.
France Mfg. Co., 10306 Berea Rd., Cleveland. (Motor Driven.)
Goehst. See Klein & Son.
Hertman. See Service Sales & Mfg. Co.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Ives Mfg. Co., Meriden, Conn.
Klein & Sons, Mathias, Chicago, Ill.
Laubscher, A., 77 Fort Pleasant Ave., Springfield, Mass.
Perfection. See Weber Machine Corp.
Pyramid Products Co., 2311 S. State, Chicago, Ill.
Service Sales & Mfg. Co., 3405 W. 159th, Cleveland, O.
Speedcraft. See Wire Stripper Co.
Thomas Steel Products Co., Warren, Ohio.
Weber Machine Corp., Rochester, N. Y.
Wire Stripper Co., 507 Erie Bldg., Cleveland, O. (Motor Driven Wire Stripper & Wire Twister.)
Zierick Machine Wks., F. R., 68 E. 131st, New York City. (Motor Driven Stripper & Twister).
SWITCHBOARD INSTRUMENTS. See Instruments, Portable and Switchboard.
SWITCHBOARD OPALS. See Lenses.
SWITCHBOARDS, SLABS AND BARRIERS
See Asbestos Slabs; Molded Insulation; Slate; Soapstone.
SWITCH (Switches).
Arms. See Posts, Binding.
"Across the Line" Type. See Controllers, Motor.
Baby Knife. See Switches, Battery.
Battery. See Switches, Battery.
Canopy. See Switches, Snap.
Clock Operated. See Switches, Time.
Feed Through. See Switches, Snap.
Fixture. See Switches, Snap.
Float. See Switches, Tank.
Flush. See Switches, Snap.

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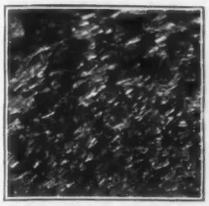

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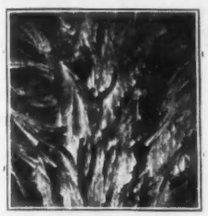

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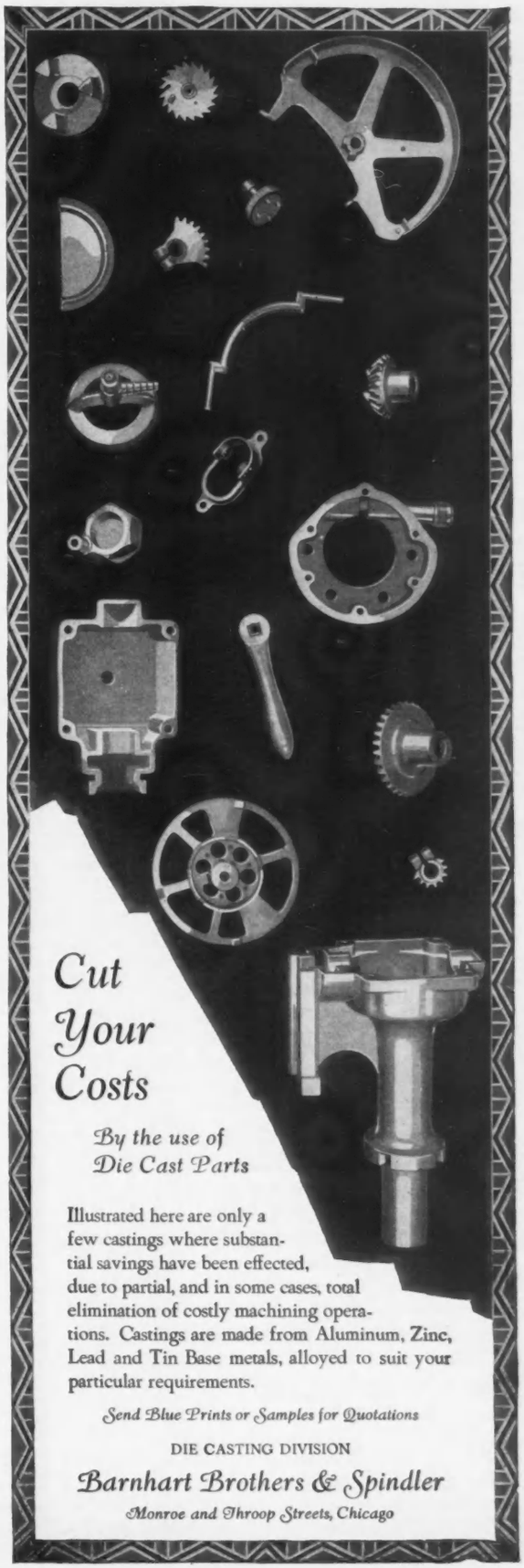

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Handles. See Handles, Wood
Knife, Baby. See Switches, Battery & Baby Knife.
Lever Radio. See Radio Mounting.
Lever. See Switches, Snap, Lever.
Limit. See Controllers, Motor.
Mercury. See Switches, Mercury
Motor Starting. Magnetic Type. See Controllers.
Motor Starting. Non-Magnetic. See Switches, Motor Starting.
Pendant. See Switches, Snap.
Pressure Regulating. See Controllers.
Push Button, Snap. See Switches, Snap.
Push Button, Motor Starting. See Switches, Remote Control.
Radio Receiver. See Radio Mountings.
Range. See Switches Snap; Heavy Duty
Remote Control. See Switches, Remote Control.
Reversing. See Controllers.
Rotary. See Switches, Snap.
Safety. See Switches, Knife.
Snap. See Switches, Snap.
Starter Type. See Controllers.
Storage Battery. See Switches, Storage Battery
Surface. See Switches, Snap.
Tank. See Switches, Tank.
Time. See Switches, Time.
Toggle. See Switches, Snap.
Tumbler. See Switches, Snap.

SWITCHES, Battery and Baby Knife

Cut-Out Switches.
Anti-Wood. See Kell & Son, Francis.
Bridgeport Switch Co., 209 Center, Bridgeport, Conn.
Bryant Electric Co., Bridgeport, Conn.
General Electric Vapor Lamp Co., 889 Adams, Hoboken, N.J.
Jefferson Electric Co., 1503 S. Laflin, Chicago, Ill.
Circle T. See Trumbull Elec. Mfg. Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn.
Crown. See Edwards & Co., Inc.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Diamond H. See Hart Mfg. Co.
Edwards & Co., Inc., 140th & Exterior, New York, N. Y.
Electrad, Inc., 428 Broadway, New York, N. Y.
Eureka. See Frank W. Morse & Co.
Fahnestock Elec. Co., cor. East Ave. and 8th, Long Island City, N. Y.
Handy. See Chicago Elec. Mfg. Co.
H. & H. See Hart & Hegeman Div.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn. (Push Button.)
Harwood. See Frank W. Morse & Co.
Heinemann Elec. Co., Trenton, N. J.
Jefferson Elec. Co., 1500 S. Laflin, Chicago, Ill.
Jost. See Frank W. Morse & Co.
Kappa. See Trumbull Elec. Mfg. Co.
Kell & Son, Francis, 401 E. 163rd, New York, N. Y.
Kendrick & Davis Co., Lebanon, N. H.
Keystone. See Frank W. Morse & Co.
King Mfg. Co., B. C., 302 Park Ave., Brooklyn, N. Y.
Knox Porcelain Corp., Knoxville, Tenn.
K-P-F Elec. Co., 855 Howard St., San Francisco, Cal.
Leviton Mfg. Co., 226 Newell, Brooklyn, N. Y.
Lyons Mfg. Co. (Mt. Carmel), New Haven, Conn.
Morse Co., Frank W., Boston, Mass.
Partrick & Wilkins Co., Philadelphia, Pa.
Porcelain Products, Inc., Findlay, Ohio.
Powerlite Switchboard Co., 4149 E. 79th, Cleveland, O.
Relishlt Electric Co., 3145 Carroll Ave. (Chicago, Ill.
Roach-Appleton Mfg. Co., 3440 N. Kimball Ave., Chicago.
Samson Electric Co., Canton, Mass.
Spero Elec. Mfg. Co., E. 33rd and Woodland Ave., Cleveland
Sta-Rite. See Frank W. Morse & Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Wood Elec. Co., C. D., 565 Broadway, New York, N. Y.

SWITCHES, Mercury

(For Temperature Control Apparatus.)
Con-Tac-Tor. See Time-O-Stat Controls Co.
Dunco. See Struthers Dunn, Inc.
General Electric Vapor Lamp Co., 883 Adams, Hoboken, N. J.
General Kontrolar Co., 200 E. First, Dayton, O.
Hywatt. See Time-O-Stat Controls Co.
Leland Electric Co., Dayton, O.
Kontax. See General Kontrolar Co. & Leland Electric Co.
Kontrolar. See General Kontrolar & Leland Electric Co.
Machlett & Son, 50 William, Long Island City, N. Y.
Mercold Corp., 4201 Belmont Ave., Chicago, Ill.
Safety Regulator Co., 529 S. Mathews, Los Angeles, Cal
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Time-O-Stat Controls Co., Elkhart, Ind.

SWITCHES, Motor Starting

Aces. See Colt's Patent Fire Arms Mfg. Co.
Adam Elec. Co., Frank, St. Louis, Mo.
Automatic Switch Co., 154 Grand, New York, N. Y.
Barber Elec. Mfg. Co., North Attleboro, Mass.
Bull Dog Electric Products Co., Detroit, Mich.
Circle T. See Trumbull Elec. Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Metal Box Co., 228 E. 144th, New York, N. Y
Crouse-Hinds Co., Syracuse, N. Y.
E. W. See Trumbull Elec. Mfg. Co.
FA. See Adam Elec. Co., Frank.
F. A. Triumph. See Metropolitan Elec. Mfg. Co.
Federal Steel Products Co., 3 Ave. L., Newark, N. J.
Large-Dall Mfg. Co., 311 N. Tenth, Philadelphia, Pa.
Leonard Elec. Mfg. Co., 2907 Perkins Ave., Cleveland, O
Lundy Co., E. A., Fulton Bldg., Pittsburgh.
MacMillen Mfg. Co., 1400 N. Spring, Los Angeles, Cal.
Major. See Adam Elec. Co., Frank.
Metropolitan Device Corp., 1250 Atlantic Ave., Brooklyn, N. Y.
Metropolitan Elec. Mfg. Co., Blvd. at 14th, Long Island City, N. Y.
Murray. See Metropolitan Device Corp.
Mutual. See Bull Dog Elec. Products Co.
Naro. See Metropolitan Elec. Mfg. Co.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Nubiade. See Colt's Patent Fire Arms Mfg. Co.
Nuwuns. See Metropolitan Elec. Mfg. Co.
Palmer Elec. & Mfg. Co., Waltham, Mass.
Robbins & Myers, Inc., Springfield, O.
Safelock. See Westinghouse Elec. & Mfg. Co.
Schmuckler & Sons, 2232 N. 28th, Philadelphia, Pa.
Square D Co., Detroit, Mich.
Switchfuz. See Adam Elec. Co.
S. S. See Wadsworth Elec. Mfg. Co.
Tanner & Co., Wm. F., 511 Sharp, Baltimore, Md.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Trumbull-Vanderpool Elec. Mfg. Co., Bantam, Conn.
Unisafti. See Metropolitan Device Corp.
Unit-Versal. See Bull Dog Elec. Products Co.
Universal Metal Box & Products Co.
V. V. Pittings Co., 711 Cherry, Philadelphia, Pa.
Wadsworth Elec. Mfg. Co., Covington, Ky.
Westinghouse Elec. & Mfg. Co., Mansfield, O.

SWITCHES, Remote Control

Push Button, Magnetically Operated.
Adam Electric Co., Frank, St. Louis, Mo.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Anderson & Co., C. J., 213 W. Austin Ave., Chicago, Ill.
Automatic Elec. Mfg. Co., Mankato, Minn.
Automatic Switch Co., 154 Grand, New York, N. Y.
Automatic Temperature Control, 34 E. Logan, Philadelphia.
Burke Controller Co., 389 Lexington Ave., New York, N.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Diamond H. See Hart Mfg. Co.
Darrin. See Automatic Switch Co.
Dunco. See Struthers Dunn, Inc.
Electric Valve Mfg. Co., 64 Murray, New York, N. Y.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hart Mfg. Co., Hartford, Conn.
H. P. See Palmer Elec. & Mfg. Co.
Industrial Controller Div. of Square Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Kato. See Automatic Elec. Mfg. Co.
Lincoln Elec. Co., Colt Rd. & Kirby Ave., Cleveland, O.
Major, F. A., System. See Adam Elec. Co.
Monitor Controller Co., 51 S. Gay, Baltimore, Md
Palmer Elec. & Mfg. Co., Waltham, Mass.
Precise Mfg. Co., 254 Mill, Rochester, N. Y.
Protectoswitch. See Precise Mfg. Co.
R. C. O. C. See South Bend Current Controller Co
Ross Safety Switch Corp., 1 E. 42nd, New York, N. Y.
Signal Engineering & Mfg. Co., 154 W. 14th, New York.
South Bend Current Controller Co., 247 La Porte, South Bend, Ind.
States Co., 19 New Park Ave., Hartford, Conn
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Takamine Corp., 208 Rawson St., Long Island City, N. Y.
Teeple Co., L. B., 540 E. Ninth, Portland, Ore.
Triplock. See Monitor Controller Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Zenith Elec. Co., 537 S. Dearborn, Chicago, Ill.

SWITCHES, Snap

	KEY
Feed Through	See p
Fixture (Canopy, Candelabra and Key Arm)	See F
Flush	See f
Lever, Toggle, Tumbler	See L
Pendant	See p
Push Button	See P
Rotary	See R
Surface	See s

See Also Switches, Snap; Heavy Duty.

Adam Electric Co., Frank, St. Louis, Mo.	f					
Anylite Elec. Co., 200 Murray, Ft. Wayne, Ind.						
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.	f	sp	P	R	L	F
Arrow Head. See Arrow Elec.						
Beaver Mfg. Co., 625 N. Third, Newark, N. J.	f	p	P			F
Best. See United States Elec. Mfg. Corp.						
Brascolite. See Guth & Co., Edwin.						
Bremer Elec. Mfg. Co., 139 N. 7th, Philadelphia, Pa.	f					
Bridgeport Switch Co., 209 Center, Bridgeport, Conn.					L	F
Bryant Elec. Co., Bridgeport, Conn.	f	sp	P	R	L	F
B. S. Co. See Bridgeport Switch Co.						
Carling Tool & Machine Co., 618 Capitol Ave., Hartford, Conn.						F
Commercial. See Gaynor Electric Co.						
Connecticut Elec. Mfg. Co., Bridgeport, Conn.		p	P	R	L	F
Crouse-Hinds Co., Syracuse, N. Y.					L	
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis.		p			L	
Diamond H. See Hart Mfg. Co.						
Dugle. See Bryant Elec. Co.						
Gaynor Elec. Co., Stratford, Conn.	f				L	
General Elec. Co., Bridgeport, Conn.	f	sp	P	R	L	F
Glo-Guide. See Bryant Elec. Co.						
Gold Star Push Switch. See Hart & Hegeman.						
Guth & Co., Edwin, 2625 Washington Ave., St. Louis, Mo.						F
Hart Mfg. Co., Hartford, Conn.	f	sp	P	R	L	
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. (Door Bolt Control)	f	sp	P	R	L	F
Hart. See Hart & Hegeman.						
H. & H. See Hart & Hegeman Mfg. Co.						
Hubbell, Inc., Harvey, Bridgeport, Conn.		sp			L	F
Kell & Son, Francis, 401 E. 163rd, New York, N. Y.	f		P			
Leviton Mfg. Co., 226 Newell, Brooklyn						F
Levoller. See McGill Mfg. Co.						
McGill Mfg. Co., Valparaiso, Ind.	f				L	F
Marks Products Co., 80 N. Ninth, Brooklyn, N. Y.						L F
Metropolitan Elec. Mfg. Co., Blvd at 14th St., Long Island City, N. Y.	s			R		
Morse Co., Frank W., 291 Congress, Boston			P			
National. See Standard Elec. Co.						
New England. See Paulding, John L.						
Nutmeg. See Hubbell, Harvey, Inc.						
Pass & Seymour, Div. H, Solvay Sts., Syracuse, N. Y.	f	sp	P		L	F
Paulding, John L. New Bedford, Mass.	f	s	P			
Pen Tap. See Beaver Mfg. Co.						
Perkins. See Bryant Elec. Co						
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y.					L	
Pilotoggle. See Pilot Radio & Tube Corp.						
Pilotoggle. See Pilot Elec. Mfg. Co.						
Pullrite. See Morse, Frank W.						
Rhodes, Inc., M. H., Chamber of Commerce Bldg. New Haven, Conn.					L	
Rodale Mfg. Co., Emaus, Pa.		p				
Rodale Mfg. Co., 200 Hudson, New York	p					
Sears, Henry D., 80 Boylston, Boston	f	sp	P	R	L	F
Smith & Co., T. C., 3915 Pewelten Ave., Philadelphia, Pa.			P			
Snaptt. See Marks Products Co.						
Spartan. See Bryant Elec. Co.						
Standard Elec. Mfg. Co., 941 Wrightwood Ave., Chicago, Ill.	f	s	P	R	L	
Starite. See Morse Co., Frank W.						
Trigle. See Bryant Elec. Co.						
Tumbolier. See Hart & Hegeman.						
Twi-Lite. See McGill Mfg. Co.						
United States Elec. Mfg. Corp., 222 W. 114th, New York, N. Y.	f					
Victor. See Kell & Son, Francis.						
Washington. See Gaynor Electric Co.						
Weber. See Sears, Henry D.						
Yankee. See Bryant Elec. Co.						

SWITCHES, Snap; Heavy Duty

Heavy duty rotary snap switches for Electric Range and Small Motor Control.
Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Bryant Electric Co., 1421 State, Bridgeport, Conn.
Diamond H. See Hart Mfg. Co.
Domestic Electric Co., Kent, O.
General Electric Co., Section W-234, Merchandise Dept., Bridgeport, Conn.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.

SWITCHES, Storage Battery; Automatic Disconnecting

Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Penn Electric Switch Co., E. 20th & Walnut Sts., Des Moines, Ia.
Radioloc. See Cutler-Hammer Mfg. Co.

SWITCHES, Tank

Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Blackburn-Smith Corp., 25 W. 45th, New York, N. Y.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
General Electric Co., Schenectady, N. Y.
Industrial Controller Div. of Square Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Ostrander Elec. Wks., W. R., 911 Atlantic Ave., Brooklyn.
Penn Elec. Switch Co., 20th & Walnut, Des Moines, Ia.
Roberts & Kanze Elect. Repair Co., 240 W. 25th, New York.
Sundh Elec. Co., 209 Parkhurst, Newark, N. J.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SWITCHES, Time (Automatic Clock Operated Switches)

Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass
Astrachron. See Gem Engineering Co.
Automatic Elec. Mfg. Co., Mankato, Minn.
Automatic Lighting Co., 831 Greenmount Ave., Baltimore.
Brown & Pengilly, Inc., 1264 Folsom, San Francisco, Cal.
Buckeye Time Switches, Inc., 1557 St. Clair Ave., Cleveland, O.
Campbell Electric Mfg. Co., 15 Stewart, Lynn, Mass.
Cramer & Co., R. W., 136 Liberty, New York, N. Y.
Electric Steam Radiator Co., 513 Stewart, Seattle, Wash
Eureka Tool & Machine Co., 43 Walnut, Newark, N. J.
Frisch, Walter P., 104 Linden, Rochester, N. Y.
Gem Engineering Co., Hempstead, N. Y.
General Electric Co., Schenectady, N. Y.
Go-N-Set. See G. & S. Research Lab.
G & S. Research Laboratory, 1269 Cochran Ave., Los Angeles, Cal.
Hart Mfg. Co., Hartford, Conn.
Horni Signal Mfg. Co., 290 Hudson, New York, N. Y.
Horolectrical Corp., 116 W. 14th, New York, N. Y.
Jewel. See Time Switch Sales & Service.
Kwixset. See Thompson Clock Co.
Lamp-Lighter. See Robbins & Myers Co.
Liberty Bell Mfg. Co., Minerva, Ohio.
Mercury Time Switch Co., Marine City, Mich
New Haven Clock Co. (Elm City), New Haven, Conn.
Northwestern Clock Co., 515 Brown Bldg., Omaha, Neb
Paragon Elec. Co., 407 S. Dearborn, Chicago, Ill.
Racine. See Reliance Automatic Ltg. Co.
Radio Owl, 2269 E. 51st, Los Angeles, Cal
Radio Switchman. See New Haven Clock Co.
Reliance Automatic Ltg. Co., 1925 Meade, Racine, Wis.
Research Mfg. Laboratory, 1269 Cochran Ave., Los Angeles
Rhodes, Inc., M. H., Chamber of Commerce Bldg., New Haven, Conn.
Robbins & Myers Co., Springfield, O.
Ross Safety Switch Corp., 1 E. 42nd, New York, N. Y
Sangamo Elec. Co., Springfield, Ill.
Sauter. See Cramer & Co.
Sentinel. See Electric Steam Radiator Co.
Stat-Amatic Instrument & Appliance Co., Hartford, Conn.
States Co., Hartford, Conn.
Stromberg Electric Co., 223 W. Erie, Chicago, Ill.
Thompson Clock Co., H. C., Bristol, Conn.
Time Switch Sales & Service, 1841 Euclid Ave., Cleveland.
York Clocks, Inc., 12 E. 41st, New York, N. Y.
Walser Automatic Timer Co., 405 Lexington Ave., New York (Also Coin Operated.)
X-L Radio Laboratories, 1224 Belmont Ave., Chicago, Ill. (Timer.)
Zenith Elec. Co., 537 S. Dearborn, Chicago, Ill.

TACHOMETERS

Speed Indicators, Speedometers, Revolution Counters
Biddle, James G., 1211 Arch, Philadelphia, Pa.
Brown Instrument Co., Wayne & Windrim, Philadelphia
Comet Elec. Co., 47 Union Trust Bldg., Indianapolis, Ind.
Durant Mfg. Co., 655 Buffum, Milwaukee, Wis.
Electric Tachometer Corp., Spring Garden & Broad St., Philadelphia, Pa.
Holtzer-Cabot Elec. Co., Boston, Mass.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa
Misener Mfg. Co., 326 E. Washington, Syracuse, N. Y.
Productimeter. See Durant Mfg. Co.
Standeo. See Stricht & Co.
States Co., 19 New Park Ave., Hartford, Conn.
Stricht & Co., H. H., 19 Park Row, New York, N. Y.
Tetco-Tim. See Elec. Tachometer Corp.
Veeder Mfg. Co., 14 Sargeant, Hartford, Conn.
Weston Elecl. Instrument Co., 582 Frelinghuysen Ave., Newark, N. J.
Zernickow Co., O., 15 Park Row, New York, N. Y.

TAGS, Cable; Pole and Battery

American Radio Hardware Co., 135 Grand, New York, N. Y. (Battery Lead Tags.)
Benedict Mfg. Co., East Syracuse, N. Y.
Brecklin Underground Elec'l Mfg. Co., Glenside, Pa.
Crowe Name Plate & Mfg. Co., 1749 Grace, Chicago, Ill.
Grammes & Sons, Inc., L. F., Allentown, Pa.
International Tag Co., 319 N. Whipple, Chicago, Ill.
Matthews & Co., Jas. H., 3942 Forbes, Pittsburgh, Pa.
Premax Products, Inc., 230 Tenth, Niagara Falls, N. Y.
Viking Tool & Machine Co., 745 65th, Brooklyn, N. Y.
Waterbury Button Co. (Elecl. Mfg. Dept.), Waterbury Conn.

TAGS, Shipping

Campbell Paper Box Co., 904 S. Main, South Bend, Ind.
International Tag Co., 319 W. Whipple, Chicago, Ill.

TAMPING TOOLS, COIL. See Tools, Commutator Truing
TANK SWITCHES. See Switches, Tank.
TANKS, OIL SWITCH & BREAKER. See Cabinets, Sheet Steel.
TANKS, TINNING. See Wire Manufacturing Machines.

TANTALUM

Fansteel Products Co., Inc., North Chicago, Ill.

TAPE, Asbestos

American Asbestos Co., Norristown, Pa.
Asbestos Fibre Spinning Co., North Wales, Pa.
Perodo & Asbestos, Inc., New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.
Matthews & Co., Jas. H., 3942 Forbes, Pittsburgh, Pa.
Micalite. See Mitchell-Rand Mfg. Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y
Wingrite. See Johns-Manville, Inc.
Shield Brand. See Mitchell-Rand Mfg. Co.

TAPE, Cotton, Linen, Silk;

Tape, Sleeving, Webbing.
Anchor Webbing Co., 300 Brook, Pawtucket, R. I. (Cotton Silk).
Anwabco. See Anchor Webbing Co.
Eagle. See Sidebotham, Inc., John.

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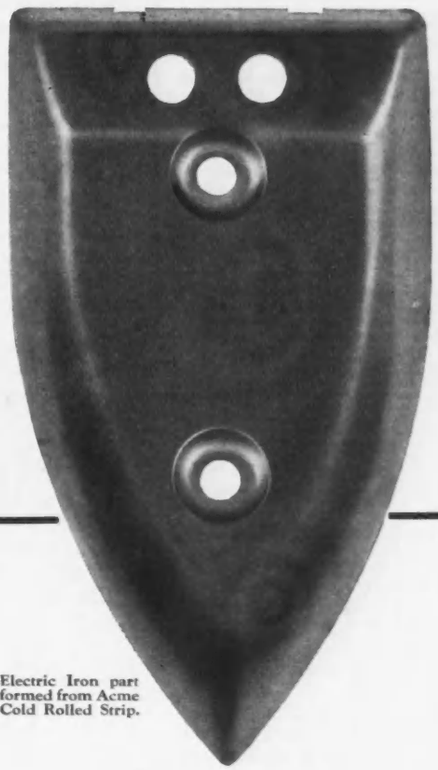

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Hope Webbing Co., 1005 Main, Providence, R. I.
Krout & Fite Mfg. Co., Allegheny Ave. & Emerald Philadelphia, Pa.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pearce Co., R. T., Covington, Ky.
Shield Brand. See Mitchell-Rand Mfg. Co.
Sidebotham, Inc., John, 4317 Griscom, Philadelphia, Pa.
Smith Belting Co. (Germantown), Philadelphia, Pa.
Superfine. See Windsor Webbing Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Windsor Webbing Co., Pawtucket, R. I.
Worcester Braiding Co., 34 Southbridge, Worcester, Mass.

TAPE, Mica

Continental Diamond Fibre Co., Newark, Del.
Mica Insulator Co., 200 Varick, New York, N. Y
Micalite. See Mitchell-Rand Mfg. Co.
Mica Mfg. Co., 135 Johnson, Brooklyn, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPE, Rubber and Friction

Ackerman. See Ackurate Rubber Co.
Ackurate Rubber Co., 25 Beaver St., New York, N. Y.
Adamson & Co., Joseph, Columbia and Germantown Aves. Philadelphia, Pa.
Adhere. See Westinghouse Elec. & Mfg. Co.
Alpha. See Johns-Manville, Inc.
Amazon. See Graybar Elec. Co.
Appleton Rubber Co., Franklin, Mass.
Black Diamond. See Dunton Co., M. W.
Boston Woven Hose & Rubber Co., Boston, Mass.
Brooklyn. See Johns-Manville, Inc.
Bull-Dog. See Boston Woven Hose & Rubber Co.
Candee. See Ackurate Rubber Co.
Canfield Rubber Co., Bridgeport, Conn.
Canton. See Plymouth Rubber Co.
Clifton. See Clifton Mfg. Co.
Clifton Mfg. Co., 65 Brookside Ave., Boston 30, Mass.
Competition. See New York Insulated Wire Co.
Double-Wear. See Dryden Rubber Co.
Consumers Rubber Co., 1302 Ontario, N., Cleveland, O.
Coruco. See Consumers Rubber Co.
Criterion. See Consumers Rubber Co.
Dryden Rubber Co., 1014 S. Kildare Ave., Chicago, Ill.
Dundee, A. & B. See Okonite Co.
Dunton Co., M. W., 670 Eddy St., Providence, R. I.
Dutch-Brand. See Van Cleef Bros.
Elkhart Rubber Wks., Elkhart, Ind.
Firestone Tire & Rubber Co., Akron, O.
General Electric Co. Merchandise Dept., Bridgeport, Conn.
Graybar Elec. Co., Graybar Bldg., New York, N. Y.
Grimshaw. See New York Insulated Wire Co.
Griptite. See Canfield Rubber Co.
Holfast Rubber Co., Atlanta, Ga.
Holdtite. See United States Rubber Co.
Hydro-Proof. See Elkhart Rubber Wks.
Imperial Rubber Co., 220 Broadway, New York, N. Y.
Impervo. See Canfield Rubber Co.
Ireo. See Imperial Rubber Co.
Johnson & Johnson, New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.
Jomanco. See Johns-Manville, Inc.
Jonflex. See Johnson & Johnson.
Kerite Ins. Wire & Cable Co., 30 Church, New York, N. Y.
Manson. See Okonite Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
New York Insulated Wire Co., 114 Liberty, New York, N. Y.
Nozall. See Consumers Rubber Co.
Okonite Co., Passaic, N. J.
O. K. See Appleton Rubber Co.
F. & B. See Ruberoid Co.
Paratex. See Appleton Rubber Co.
Paruco. See Passaic Rubber Co.
Passaic Rubber Co., Clifton, N. J.
Plymouth Rubber Co., 1400 Revere, Canton, Mass.
Red-X. St. Louis Rubber Cement Co.
Rellio. See United States Rubber Co.
Ruberoid Co., 95 Madison Ave., New York, N. Y.
Sitco. See Superior Insulation Tape Co.
Slipkmot. See Plymouth Rubber Co.
Star. See Sullivan & Sons Mfg. Co., J.
Sticks. See Graybar Elec. Co.
Stitwell. See Clifton Mfg. Co.
Sullivan & Sons Mfg. Co., J., 2254 N. 9th, Philadelphia, Pa.
Superior Insulating Tape Co., 3044 Lambain Ave., St. Louis.
2-Plex. See Holfast Rubber Co.
U. S. See United States Rubber Co.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Usco. See United States Rubber Co.
Van Cleef Bros., 7722 Woodlawn Ave., Chicago.
Victor. See Graybar Elec. Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPE, Varnished Fabric

Acme Wire Co., New Haven, Conn.
Continental Diamond Fibre Co., Newark, Del.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Irv-O-Flatseme. See Continental Diamond Fibre Co.
Mica Insulator Co., 200 Varick, New York, N. Y
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
New Jersey Wood Finishing Co., Amboy Ave., Woodbridge, N. J.
Radiotape. See Respro, Inc.
Respro, Inc., Wellington Ave. (Auburn), Providence, R. I.
Shield Brand. See Mitchell-Rand Mfg. Co.
Sico. See Standard Insulator Co.
Standard Insulation Co., East Rutherford, N. J.
Voltape. See Respro, Inc.

TAPING MACHINES, Coil

Chapman Electric Works, P. E., 1320 Chouteau Ave., St Louis, Mo.

Columbia Machine Works & Malleable Iron Co., 263 Chestnut, Brooklyn, N. Y.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Griswold Machine Co., George, New Haven, Conn.
Ridlen Company, Frank, Boston, Mass.
Segur. See Electric Service Supplies Co.
Seifert, E. R., Syracuse, N. Y. (Automatic.)

TAPING MACHINES, Wire

American Insulating Machinery Co., 519 Huntington Ave. Philadelphia, Pa.
Wire Machinery Corp. of Am., New Haven, Conn.

TAPS. See Stocks, Dies and Reamers.
TENSION DEVICES, Coil Wire. See Racks, Wire Reel

TENSION MACHINES, Band Wire

Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.

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Low Tension, Secondary Terminals and Connectors.
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Burton-Rogers Co., Boston, Mass.
Clark Metal Products, 490 Hancock Ave., Bridgeport.
Dixie Supply Co., 91 7th Ave., New York.
Double Grip. See Pons, Eugene
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Electron. See Bassett Metal Goods Co.
Fahnestock Elec. Co., East Ave. and 8th, Long Island City, N. Y.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Ideal Clamp Mfg. Co., 198 Bradford, Brooklyn, N. Y.
K. E. M. See Kulier Elec. Mfg. Co.
Kulier Elec. Mfg. Co., 575 Pierce Ave., Long Island City
Morse Co., Frank W., 291 Congress, Boston, Mass.
Nu-Way Snap. See Hatheway Mfg. Co.
Ohio Parts Co., 3301 Colerain Ave., Cincinnati, O.
Orum, S. B. M., 503 N. 11th, Philadelphia, Pa.
Patten-MacGuyer Co., Providence, R. I.
Rajah Co., Bloomfield, N. J.
Salem Elec'l Supply Co., 285½ Bridge, Salem, Mass.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Shuro. See Burton-Rogers Co.
Tinkerbox. See Weber Elec. Wks.
Waterbury Button Co. (Elecl. Mfg. Dept.), Watebury, Conn.
Weber Elec. Wks., Brooklyn Sts., Cleveland, O.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.
Zierick Machine Wks., F. R., 68 East 131st, New York.

TERMINAL BLOCKS

Penn Union Elec. Corp., Erie, Pa.

TEST BENCHES, Armature

Allen Electric & Equipment Co., Kalamazoo, Michigan.
Burton-Rogers Co., Boston, Mass.
Hobart Bros. Co., Troy, Ohio.
Marshall Elec. Co., Elkhart, Ind.
Miho Company, 717 Sycamore, Cincinnati, Ohio.
North East Appliance Corp., Rochester, N. Y.
Pence & Son, H. O., San Luis Obispo, Cal.
Weidenhoff, Joseph, 4352 Roosevelt Road, Chicago, Ill.

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Ace. See Weidenhoff, Joseph.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Allen Electric & Equipment Co., Kalamazoo, Michigan.
Ankenbrandt, J. J., 2140 Wakeman, Toledo, Ohio.
Armeter. See Chapman Electric Works, P. E.
Burton-Rogers Co., 857 Boylston, Boston, Mass.
Century Electrical Co., 100 Randall Ave., Syracuse, N. Y.
Chapman Elec'l Works, P. E., 1320 Chouteau Ave., St Louis, Mo
Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O.
Colpin Corp., 6110 S. Main, Los Angeles, Cal.
Columbia. See Weidenhoff, Joseph.
Comparometer Co., New Ulm, Minn.
Economy. See Weidenhoff, Joseph.
Electric Controller & Mfg. Co., 2760 E. 79th, Cleveland.
Electrotest. See Comparometer Company.
Ev-Ri-Test. See Weidenhoff, Joseph.
Ga-Jit. See General Instrument Corp.
General Instrument Corp., 225 Varick, New York, N. Y.
Hobart Bros. Co. Troy, Ohio.
Ideal. See Ankenbrandt, J. J.
Indiana Mfg. & Electric Co., Marion, Indiana.
Kurman Engineering Corp., 29 East End Ave., New York.
Leich Electric Co., Genoa, Ill.
Lundin Electric Machine Co., 10 Thacher, Boston, Mass.
Mallory Electric Co., Factories Bldg., Tulede, Ohio.
Marshall Elec. Co., Elkhart, Ind.
Miho Company, 717 Sycamore, Cincinnati, Ohio.
North East Appliance Corp., Rochester, N. Y.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Panoltest. See Allen Elec. & Equip. Co.
Portometer. See Allen Elec. & Equip. Co.
Portostat. See Allen Elec. & Equip. Co.
Presto. See Metal Specialties Mfg. Co.
Rex Batrystat. See Bartlett Products Co.
Rubicon Co., 29 N. Sixth, Philadelphia, Pa.
Scout. See Leich Electric Company.
States Co., 19 New Park Ave., Hartford, Conn. (Transformer Test Table)
Test-All. See Colpin Corp.
Test-O-Meter. See Weidenhoff, Joseph.
Test-Rite. See Colpin Corp.
Victory. See Weidenhoff, Joseph.
Weidenhoff, Joseph, 4352 Roosevelt Road, Chicago, Ill.

TESTING INSTRUMENTS. See Instruments.

TESTING LABORATORIES

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Elec'l Testing Laboratories, 80th St. and East End Ave., New York, N. Y.
National Elec'l Inst. Co., 163 Sidney, Cambridge, Mass.
New York Testing Laboratories, 80 Washington, New York.
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THERMO JUNCTIONS. See Instruments, Laboratory Standard.

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General Plate Co., Attleboro, Mass.
Improved Seamless Wire Co., 775 Eddy, Providence, R. I.
Interstate Products Corp., 503 Mulberry, Newark, N. J.
National-Harris Wire Co., Newark, N. J.
Venbur. See Coffin Mfg. Co., B. F.
Wilco. See H. A. Wilson Co.
Wilson Co., H. A., Newark, N. J.

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American Thermostat Co., 226 Jolliff Ave., Newark, N. J.
Automatic Appliance Co., Jackson, Mich.
Bake-O-Meter. See Cooper Oven Thermometer Co.
Bak-Rite. See Electric Appliance Mfg. Co.
Bishop & Babcock Sales Co., 4901 Hamilton Ave., N. E., Cleveland, O.
Boston Machine Wks. Co., 7 Willow, Lynn, Mass.
Brown. See Electric Automatic Appliance Co.
Brown Instrument Co., Wayne & Windrim, Philadelphia, Pa.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J.
Cooper Oven Thermometer Co., Pequabuck, Conn.
Diamond H. See Hart Mfg. Co.
Dunco. See Struthers Dunn, Inc.
Electric Automatic Appliance Co., 1748 Arapahoe, Denver, Colo.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O.
Electric Maid. See Hankscraft Co.
Freas Thermo-Electric Co., 1206 S. Grove, Irvington, N. J.
General Electric Co., Schenectady, N. Y. (For Melting Pot.)
Globe Mfg. Co., Battle Creek, Mich.
Hankscraft Co., 615 E. Washington, Madison, Wis.
Hart Mfg. Co., Hartford, Conn.
Hi-Lo. See Boston Machine Wks. Co.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Interstate Products Corp., 503 Mulberry, Newark, N. J.
King. See Electric Heat Control Co.
Klixon. See Westinghouse Electric & Mfg. Co.
Marvel. See American Thermostat Co.
Mercoid Corp., 4201 Belmont Ave., Chicago, Ill.
Moeller Instrument Co., 251 Sumpter, Brooklyn, N. Y.
National Steel Construction Co., 425 Fountenae, Seattle, Wash.
Pyratherm. See Mercoid Corp.
Safety Regulator Co., 529 S. Mathews, Los Angeles, Cal.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
Stat-Amatic Instrument & Appliance Co., Hartford, Conn.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa
Tagliabue Mfg. Co., C. J., 18 83rd, Brooklyn, N. Y.
Thermolectric. See Bishop & Babcock Sales Co.
Time-O-Stat Controls Co., Elkhart, Ind.
Trent Co., Harold E., 439 N. 12th, Philadelphia, Pa.
Visaflame. See Mercoid Corp.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilcolator Co., Newark, N. J.

TIGHTENERS, Commutator

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TIME SWITCHES. See Switches, Time.

TIN FOIL

Cobb Elec. Appliance Co., 100 Massachusetts Ave., Boston.
Lehmaier, Schwartz & Co., 521 W. 25th, New York, N. Y.
United States Foil Co., 30th & Grand Sts., Louisville, Ky.

TINNING TANKS, WIRE. See Wire Manufacturing Machines.

TINSEL. See Tinsel, Cord & Thread.

TINSEL, Cord and Thread

Belden Mfg. Co., 4633 W. Van Buren, Chicago, Ill.
Diamond Braiding Mills, Chicago Heights, Chicago, Ill
Empire Notion Co., 335 W. 35th, New York, N. Y.
Frank & Co., M. J., 15 W. 39th St., New York, N. Y.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hy-Sil Mfg. Co., Revere, Mass.
Kile Co., 2 E. 23rd, New York, N. Y.
Koelle, Frederick C., Real Estate Trust Bldg., Philadelphia
Lees Mfg. Co., 220 Broadway, New York, N. Y.
Montgomery Co., J. R., Windsor Locks, Conn.
Rockbestos Products Corp., 369 Nicoll, New Haven, Conn.
Springfield Wire & Tinsel Co., Springfield, Mass.

TIPS, Cord

Duro. See McEvoy, C. H.
General Cable Corp., 420 Lexington Ave., New York, N. Y.
McEvoy, C. H., 430 Broadway, Lowell, Mass.
National Acme Mfg. Co., 7500 Stanley Ave., Cleveland, O.
Norden & Co., S. 180 S. Water, Providence, R. I.
Waterbury Brass Goods Corp., Waterbury, Conn.

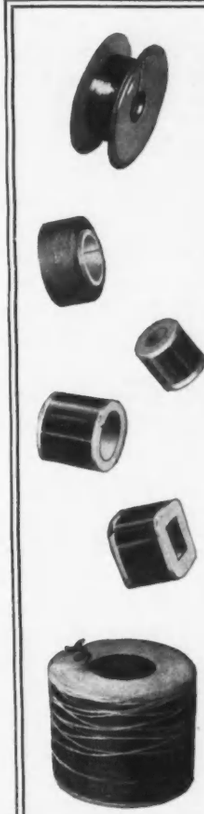
TOOLS, Commutator Slotting. See Slotting Machines & Tools, Commutator.

TOOLS, Coil Tamping

Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.

TOOLS, Commutator Truing

Acme. See Green Equipment Corp.
Allen Elec. & Equipment Co., Kalamazoo, Mich.
Binghamton Flexible Shaft Co., Binghamton, N. Y.
Central Mfg. Co., Fairfield, Ia.
Green Equipment Corp., 260 Monadnock Block, Chicago, Ill.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Elec. Co.
Jordan Bros., 74 Beekman, New York, N. Y.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, Ohio.



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Bobbett Elec. Mfg. Co., 4307 Cottage Grove Ave., Chicago, Ill. (Knife Heaters.)
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Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O. (Steamer and Still, Filler, Separator Cutter, Clips, Carrier, Post Cutter, Terminal and Cell Puller.)
General Elec. Co., Schenectady. (Lead Burning Outfits.)
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Pyratip. See General Elec. Co.

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Bernz Co., Otto, Newark, N. J.
Dreadnaught. See Wall Mfg. Supply Co.
Jim Dandy. See Lasher-Weeber Co.
Klein & Sons, Mathias, Chicago, Ill.
Lasher-Weeber Co., 261 Franklin, Boston, Mass.
McGill Mfg. Co., Valparaiso, Ind.
Peerless. See Lasher-Weeber Co.
Stayrolite. See Klein & Sons, Mathias.
TORPEDO Cord. See Twine.
TORSION BALANCES. See Instruments, Laboratory Standard
TRANSFORMERS
Radio. See Radio Circuit Components.
Gas Tube Sign. See Transformers, Oil Burner.
Oil Burner Ignition. See Transformers, Low & Inter-

TRANSFORMERS, Low and Intermediate Voltage
For Oil Burners, Gas Tube Signs, and other special purposes.
American Bosch Magneto Corp., Springfield. Mass.
American Transformer Co., 178 Emmet, Newark, N. J.
Campbell Elec. Mfg. Co., 15 Stewart, Lynn, Mass.
Concourse Electric Co., 224 E. 137th, New York, N. Y.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Forjos. See Motorless D. C. Neon Sign Co.
General Electric Co. (Merchandise Dept.), Bridgeport, Conn.
Jefferson Electric Co., 1500 S. Laflin, Chicago, Ill.
K-W Ignition Corp., 2811 Chester Ave., Cleveland, Ohio.
Kenyon Transformer Co., 122 Cypress Ave., New York, N. Y.
Mignon Elec. Corp., 909 Genesee, Buffalo, N. Y.
Motorless D. C. Neon Sign Co., 180 E. 123rd, New York. (Neon.)
Palmers Corp., Chas. 786 Broad, Newark, N. J.
Power Transformer Co., 145 W. 22nd, New York, N. Y.
Schaeffer Bros. Co., 1059 W. 11th, Chicago, Ill.
Sorgel Electric Co., W. Water, Milwaukee, Wis.
Standard Transformer Co., Dana Ave., Warren, O
Uptigraff Mfg. Co., R. E., First National Bank Bldg., Pittsburgh, Pa.
Ward Leonard Elec. Co., Mt. Vernon, N. Y.
Webster Electric Co., Racine, Wis.
TRANSMISSION DRIVES. See Chain, Transmission.

TRANSMITTERS, Power
Controller drive giving a variety of speeds for use in connection with coil taping machines.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Segur. See Electric Service Supplies Co.
TROUBLE FINDERS. See Instruments, Portable and Switchboard; also Testers, Coil.
TRUCKS, Armature. See Lifts, Armature.

TRUCKS, Factory Steel
Angle Steel Stool Co., Plainwell, Mich.
TRUING Devices, Commutator. See Tools, Commutator.
TUBE (Tubes) (Tubing) Adapters. See Radio Receiver Parts.
Aluminum. See Aluminum.
Brass. See Tubing, Brass.
Condenser. See Tubing, Brass and Copper.
Copper. See Tubing, Brass.
Cutters. See Stocks, Dies, etc.
Fibre. See Fibre.
Fibre Candle. See Candles.
Mica. See Mica.
Nickel. See Tubing, Brass & Copper.
Paper. See Tubes, Paper.
Platinum. See Platinum.
Porcelain. See Porcelain.
Pyrometer. See Cores, Resistance.
Refractory. See Cores, Resistance.
Radio. See Radio Vacuum Tubes.
Varnished Fabric. See Tubing, Varnished Fabric.

TUBES, Paper; Cores; Sleeves. Bushings
Cleveland Container Co., 10330 Berea Rd., Cleveland, O.
Climax Tube Co., Mystic, Conn.
General Cable Corp., 420 Lexington Ave., New York, N. Y.
Klimaxcore. See Climax Tube Co.
McCausland, J. E., 86 Valley, Providence, R. I.
Pairpoint Corp., New Bedford, Mass.
Paper Tube Co., 1718 N. Damen Ave., Chicago, Ill.
Remington Mfg. Co., 939 Barnum Ave., Bridgeport, Conn.
Stone Paper Tube Co., Washington, D. C.
Textile Tube Co., Fall River, Mass. (Paper Sleeves.)

TUBING, Brass and Copper
American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
Baltimore Tube Co., 1301 Wicomico, Baltimore, Md.
Bridgeport Brass Co., Bridgeport, Conn.
Bull Dog. See National Elec. Products Corp.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., T. E., 54 Lafayette, New York
Cook, Dunbar Smith Co., 85 Sprague, Providence, R. I
Dallas Brass & Copper Co., Div. of Revere Copper & Brass, Inc., 820 Orleans, Chicago, Ill.
French Mfg. Co., 128 Robbins, Waterbury, Conn.
General Cable Corp., 420 Lexington Ave., New York, N. Y.
Michigan Copper & Brass Co., Div. of Revere Copper & Brass, 5851 W. Jefferson Ave., Detroit, Mich.
Mueller Brass Co., Port Huron, Mich.
National Copper & Smelting Co., 1395 Coltman Rd., Cleveland, O.

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National Elec. Products Corp., Inca Mfg. Div., Fort Wayne, Ind.
National-Harris Wire Co., Newark, N. J.
Relleum. See Mueller Brass Co.
Roberts Tube Works, 2500 Military Ave. Detroit, Mich.
Rome Hollow Wire & Tube Co., Div. of Revere Copper & Brass, Inc., Rome, N. Y.
Rome Turney Radiator Co., Rome, N. Y.
Scovill Mfg. Co., Waterbury, Conn.
Summerill Tubing Co., Bridgeport, Pa. (also Nickel)
Torrington Mfg. Co., Torrington, Conn.
United Wire & Supply Co., 1497 Elmwood Ave., Providence
Wells Co., A. H., Watertown Ave., Waterbury, Conn.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

TUBING, Flexible Metallic
(Flexible Tubing.)
Almond Mfg. Co., T. B., Ashburnham, Mass.
American Metal Hose Co., Waterbury, Conn.
American Metal Moulding Co., Irvington, N. J.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y.
Auto-Brassflex. See National Elec. Products Corp.
Auto-Steelflex. See National Elec. Products Corp.
Breeze Corp., Inc., 24 S. 6th, Newark, N. J.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Flexo Spring Mfg. Inc., 34 South First, Brooklyn, N. Y.
National Elec. Products Corp., Inca Mfg. Div., Fort Wayne, Ind.
Titex. See United Metal Hose Co.
Sleeper & Hartley, Inc., Worcester, Mass.
Time-O-Stat Controls Co., Elkhart, Ind.
Titeflex Metal Hose Co., Newark, N. J.
Triangle Conduit Co., Dry Harbor Rd. and Cooper Ave., Brooklyn, N. Y.
United Metal Hose Co., 724 Garrison Ave., New York N. Y
White Dental Mfg. Co. (Industrial Div.), S. S., 152 W. 42nd, New York, N. Y.

TUBING, Rubber
Rubber Tubing for Insulating Wire in Instruments and Telegraph Signal Lines.
Canfield Rubber Co., 702 Railroad Ave., Bridgeport, Conn.
Eisler Electric Corp., 756 S. 13th, Newark, N. J.
Faultless Rubber Co., Ashland, O.
Goodrich Rubber Co., B. F., Akron, O.
Rubber-Vac. See Eisler Electric Corp.
Tyler Rubber Co., Andover, Mass.
Vulcanized Rubber Co., 251 Fourth Ave., New York, N. Y.

TUBING, Varnished Fabric
Insulating Tubing—Spaghetti.
Acme Wire Co., New Haven, Conn.
Alpha Wire Corp., 520 Broadway, New York, N. Y.
Bentley-Harris Mfg. Co., Conshohocken, Pa.
Brand & Co., William, 268 Fourth Ave., New York, N. Y.
Continental Diamond Fibre Co., Newark, Del.
Empire. See Mica Insulator Co.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Goodrich Rubber Co., B. F., Akron, O.
Insulated Duct & Cable Co., Stokes, Trenton, N. J.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Lee Tire & Rubber Co., Conshohocken, Pa.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pearce Co., R. T., Covington, Ky. (Insulated Waxed Cotton.)
Turbo. See Brand & Co.
Varflex Corp., Rome, N. Y.
TURNED-UP BOXES AND CABINETS. See Cabinets, Sheet Steel.
TURNING TOOLS, COMMUTATOR. See Tools, Commutator Truing.

TWINE, Armature Winding; Torpedo Cord
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Wirne & Son, Frank W., 42 N. Front, Philadelphia, Pa.
UNDERCUTTERS, Mica. See Slotting Machines & Tools, Commutator.
UNITS, Refrigerator Condenser. See Condenser Units, Refrigerator

UNITS, Rods and Grids, Resistance
Acme Elec. Heating Co., Dept. B, 1217 Washington, Boston.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Automatic Electric Heater Co., 1524 Race, Philadelphia, Pa
Bradleyunit. See Allen Bradley Co.
Buffalo Products Co., Broome & Lafayette Sts., New York
Burger, J. P., 1813 Columbus Rd., Cleveland, O.
Calrod. See Edison General Elec. Appliance Co., Inc
Chromalox. See Edwin L. Wiegand Co.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Crown Coloring & Chemical Co., 33 W. 17th, New York.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Dalton Elec. Heating Co., 287 Bridge St., Salem, Mass.
Dalton-Marsh Co., 88 Holten, Danvers, Mass.
Di-El-Ite. See Wirt Co.
Dixon Crucible Co., Jos., Monmouth, Jersey City, N. J.
Dur-ristor. See Cutler-Hammer, Inc.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Edgerest. See Industrial Controller Div.
Edgewound. See Monitor Controller Co.
Edison General Electric Appliance Co., Inc., 5600 W. Taylor, Chicago, Ill.
Edgewound. See Monitor Controller Co. & Clark Controller Co.
Elec. Controller & Mfg. Co., 2700 E. 79th, Cleveland, O
Elemite. See Louthan Mfg. Co.
Erie Resistor Corp., 644 W. Twelfth, Erie, Pa.
Fitz-All. See Rodale Mfg. Co.
F & M. See Hiram Marks Elec. Co.
General Electric Co., Schenectady, N. Y.
Globar Corp., Niagara Falls, N. Y.
Gto-Well. See Eagle Elec. Mfg. Co.
Gold Seal Elecl. Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Hance-Parker Mfg. Co., 397 West Main, Meriden, Conn.
Hankscraft Co., 615 E. Washington, Madison, Wis. (Oven Heater Unit.)
Hardwick, Hindle, Inc., 216 Emmett, Newark, N. J.
Hexwound. See Monitor Controller Co.
Industrial Controller Div. of Square D Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Industrial Heater Co., 300 Canal, New York, N. Y.
International Resistance Co., 2006 Chestnut, Philadelphia, Pa.
Fischer's Mfg. Co., 255 Calyer, Brooklyn.
Lauts Mfg. Co., 245 N. J. R. R. Ave., Newark, N. J.
Louthan Mfg. Co., East Liverpool, O.
Marks. Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich
Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y.
Monitor Edgewound. See Monitor Controller Co. & Clark Controller Co.
Monitor Controller Co., 51 S. Gay, Baltimore, Md.
Nelco. See Nelson Electric Co.
Nelson Electric Co., Plant City, Fla.
Northern Electric Co., 2333 N. Western Ave Chicago Ill
Ohmite Mfg. Co. 629 N. Albany Ave., Chicago, Ill.
Ohm-Spun. See States Co.
Op-Al Elec. & Mfg. Co., 1057 W. 30th, Indianapolis, Ind.
Parker & Co., J. C., 407 Bulletin Bldg., Philadelphia Pa
Peloron Elec. Mfg. Corp., 28 Waverly Pl., New York, N. Y.
Presto Products Co., 520 Broadway, New York, N. Y.
Prometheus Elec. Corp., 358 W. 13th, New York, N. Y.
Pyrox. See Westinghouse Elec. & Mfg. Co.
Reben Elec. Mfg. Co., 2024 Gravesend Ave., Brooklyn, N. Y

Remco. See Reben Elec. Mfg. Co.
Repairall. See Waage Elec. Co.
Replaceall. See Waage Elec. Co.
Ribohm. See Ward Leonard Elec. Co.
Rodale Mfg. Co., Emaus, Pa.
Rubicon Co., 29 N. Sixth, Philadelphia, Pa.
Schaeffer Bros. Co., 1059 W. 11th, Chicago, Ill.
Seico. See Automatic Electric Heater Co.
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia, Pa.
Smoothwound. See Monitor Controller Co.
Snoco. See Snow & Co.
Snow & Co., E. W., 20 N. Water, Rochester, N. Y.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa
Super. See Northern Elec. Co.
Superior Resistor Corp., 334 Badger Ave., Newark, N. J.
(Radio)
United Metal Art Mfg. Co., 293 Wyckoff Ave., Brooklyn, N.Y
Vitrohm. See Ward Leonard Elec. Co.
Waage Elec. Co., 5100 W. Ravenswood Ave., Chicago.
Ward Leonard Elec. Co., Mt. Vernon, N. Y.
Warren Elec. Appliance Co., Warren, Pa.
Watlow Elec. Mfg. Co., 1520 N. 23rd, St. Louis, Mo.
Westinghouse Elec. & Mfg. Co., Mansfield, O.
White Dental Mfg. Co., S. S., 152 W. 42nd, New York, N. Y. (Radio.)
Wiegand Co., Edwin L., 7530 Thomas Blvd., Pittsburgh, Pa.
Wirt Co., 5221 Greene. Philadelphia, Pa.
VACUUM CLEANER BAGS. See Bags, Vacuum Cleaner.
VACUUM DRYING & IMPREGNATING OVENS. See Ovens, Industrial.

VALVES, Electrically Operated
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill
Asco. See Automatic Switch Co.
Automatic Switch Co., 154 Grand, New York
Automatic Temperature Control Co., 34 E. Logan, Philadelphia, Pa.
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Electric Steam Radiator Co., 8th Ave & Virginia, Seattle, Wash.
Electric & Valve Mfg. Co., 64 Murray, New York, N. Y.
Electromatic Gas Control Corp., 1802 Columbus Rd., Cleveland, O.
Gas-Gard Co., 375 Main St., E., Rochester, N. Y. (Gas.)
General Electric Co., Schenectady, N. Y.
Golden-Anderson Valve Specialty Co., 1385 Fulton Bldg., Pittsburgh, Pa.
Lunkenheimer Co., Cincinnati, O.
Minneapolis-Honeywell Regulator Co., 2753 Fourth Ave., Brooklyn, N. Y.
Michigan Metal Products Co., Battle Creek, Mich.
Nacco Mfg. Co. 1483 Clara Ave., St. Louis, Mo.
Northside Elec. Co., 4227 Spring Grove Ave., Cincinnati, O.
Nu-Way Water Heater Control, Inc., 368 Erie Bldg., Cleveland, O.
Preferred Utilities Mfg. Corp., 33 W. 60th, New York, N.Y.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
St. Louis Motor Valve Co., St. Louis, Mo.
Sentinel. See Electric Steam Radiator Co.
Tagliabue Mfg. Co., C. J., 18-83rd St., Brooklyn, N. Y.
Teeple Co., L. R., 540 E. Ninth, Portland, Ore. (Gas.)
Time-O-Stat Controls Co., Elkhart, Ind.
Victor. See Lunkenheimer Co.
Zeco. See Zisch Engineering Corp.
Zisch Engineering Corp., 39 Avenue L, Newark, N. J. (Gas.)
VARNISH. See Paint, Varnish, Lacquer.
VARNISHED TAPE. See Tape, Varnished Fabric.
VARNISHED TUBING. See Tubing, Varnished Fabric.
VOLT BOXES. See Instruments, Laboratory Standard.
VOLTMETERS. See Instruments.
VULCANITE. See Rubber, Hard.
VACUUM PUMPS. See Pumps, Vacuum.

VULCANIZERS, WIRE INSULATION
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Biggs Boiler Works Co., Akron, Ohio.
WASHERS, FIBRE. See Fibre.

WASHERS, Lock
Washers, Non-Metallic. See also Gaskets, Fibre.
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
(Clegg Lock Washer Co., 4725 W. Lake, Chicago, Ill.
Hobbs Mfg. Co., Worcester, Mass.
Kantlink. See National Lock Washer Co., Positive Lock Washer Co., Mansfield Lock Washer Co., Reliance Mfg. Co. & American Nut & Bolt Fastener Co.
Keystone. See Positive Lock Washer Co.
Mansfield Lock Washer Co., Mansfield O.
Massachusetts Machine Shop, Inc. Boston, Mass.
National Lock Washer Co., 40 Hermon, Newark, N. J.
Positive Lock Washer Co. Ave. A & Miller, Newark, N. J.
Reliance Mfg. Co., Massillon, O.
Shakeproof Lock Washer Co., 2533 N. Keeler Ave., Chicago.
St. Louis Malleable Casting Co., 7701 N. Conduit Ave., St. Louis, Mo.

WASHERS, Metallic
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Hubbard Spring Co., M. D., Pontiac, Mich.
New England Screw Co., Dept. A., 44 Farnsworth, Boston.
Quadrigs Mfg. Co., 213 W. Grand Ave., Chicago, Ill.
Russell Mfg. Co., John M., Naugatuck, Conn.
United Screw & Bolt Corp., 2713 Cullerton, Chicago, Ill
Wrought Washer Mfg. Co., 46 S. Bay, Milwaukee, Wis.
WATTMETERS. See Instruments.

WASHERS, Non-metallic
See also Gaskets, Fibre.
Michigan Leather Washer Co., 548 E. Fort, Detroit, Mich.

WAX AND COMPOUNDS
Wax and Compound, Sealing and Filling.....See W
Junction Box, Potheads, Battery Tops, Bolt Head Holes
Wax and Compound.....See B
Saturating and Finishing, Braided Wire, Impregnating Fabric and Paper.
Chatterton's Compound .....See C
Ackurate Rubber Co., 25 Beaver, New York, N. Y. W . . .
Ajax. See Sherwin-Williams Co.
Asphalt Products Co., 6531 S. State, Chicago.. . . S . .
Bishop Wire & Cable Corp., 420 E. 25th, New York, N. Y. C
Biwax Corp., 208 S. La Salle, Chicago, Ill..... W S . .

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WAX AND COMPOUNDS—Continued
Brand & Co., William, 268 Fourth Ave., New York, N. Y. ..... W . . .
Bulls-Eye. See Zinsser & Co.
Cablelene. See Vacuum Oil Co.
Candy & Co., 35th and Maplewood Ave., Chicago W S . .
Cerowax. See Vacuum Oil Co.
Clifton Mfg. Co., 65 Brookside Ave., Boston..... C
Cochrane Chemical Co., 432 Danforth Ave., Jersey City, N. J..... W S . .
Dolph Co., John C., 155 Emmet, Newark, N. J. W . . .
Di Electric Puttie. See Ackurate Rubber Co.
Ever-Protect. See National Cable Compound Co.
Fiske White. See Williams Co., F. M.
General Electric Co., Bridgeport, Conn..... W . . .
George Co., P. D., St. Louis..... W . . .
Globe Chemical Co., Murray Road & Big 4 R. R. St. Bernard, Cincinnati, O..... W S . .
Goldo Brown. See Williams Co., F. M.
Great Lakes Thread & Yarn Co., Div. of General Cable Corp., 5133 Wesson Ave., Detroit... W . . .
Hercules Powder Co., 975 Market, Wilmington, Del. (Wood Rosin) ..... S . .
Hexsulate. See Tar Products Corp.
Imco. See Great Lakes Thread & Yarn Co.
India Red Seal. See Williams Co., F. M.
Insulatine Co., 1 Broadway, New York..... W . . .
Insulation. See Vacuum Oil Co.
Knox & Morse Co., 80 Freeport, Boston, Mass..... W S . .
Leverite. See Mitchell-Rand Mfg. Co.
Lime Seal. See Mitchell-Rand Mfg. Co.
McGill Mfg. Co., Valparaiso, Ind..... C
Minerallac Elec. Co., 1045 Washington Blvd., Chicago, Ill. ..... W . .
Mitchell-Rand Mfg. Co., 19 Vesey, New York.... W S C
Mule-Hide. See Lehon Co.
National Cable Compound Co., Mitchell, Ind.... W . . .
National Wax Co., 189 W. Madison, Chicago, Ill. . . S . .
Nu-Blac. See Star Porcelain Co.
Par Flexo. See Williams Co., F. M.
Rubberseal. See Mitchell-Rand Mfg. Co.
Rub-Flexo. See Williams Co., F. M.
Seidner & Enequist, Inc., 86 Hausman, Brooklyn, N. Y. ..... W . .
Sherwin-Williams Co., Cleveland, O..... W . . C
Standard Varnish Wks., 433 4th Av., New York.. W . . .
Standard Wax & Import Co., 110 E. 42nd, New York, N. Y. ..... W S . .
Star Porcelain Co., Muirhead Ave., Trenton, N. J. W . . C
Tacrite. See Seidner & Enequist, Inc
Tar Products Corp., Indiana Trust Bldg., Providence, R. I. ..... S . .
Tretter & Co., E. T., 576 Johnson Ave., Brooklyn, N. Y. ..... W S . .
Vacuum Oil Co., 61 Broadway, New York, N. Y. W . . .
Warner-Quinlan Co., 2 Park Ave., New York, N. Y. . . . C
Waverly Oil Wks., 54th and A. V. R. R., Pittsburgh, Pa. ..... S . .
Williams Co., F. M., 1288 Prospect Ave., Brooklyn, N. Y
Zinmer & Co., 48 Vesey, New York, N. Y..... W . . .

WEDGE DRIVERS. See Tools, Commutator.
WELDS, Lamp Lead-in. See Filaments, Incandescent

WELDING AND CUTTING OUTFITS

Electric Arc, Spot, Butt and Seam Metal Welders and Metal Cutting Outfits.

Acme Elec. Welder Co., 1850 W. Fulton, Chicago, Ill.
A. E. F. See American Electric Fusion Corp.
Agnew Electric Welder Co., Milford, Mich.
Allan Mfg. & Welding Co., Inc., 726 Washington, Buffalo.
Almanc. See Allan Mfg. & Welding Co., Inc.
Alternare. See Electric Arc Cutting & Welding Co.
American Elec. Fusion Corp., 2610 Diversey Ave., Chicago
Burke Electric Co., Erie, Pa.
Economy Electric Products Co., 2400 Woodland Ave., Cleveland, O.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Electric Arc Cutting & Welding Co., 156 Jelliff Ave., Newark N. J.
Electric Welding, 744 Court, Brooklyn, N. Y.
Electric Welding Machine Co., 1530 Larned, E., Detroit.
Farwest Electric Welder Co., 1107 Northlake Ave., Seattle.
Federal Machine & Welder Co., Dana Ave., Warren, O.
Fleet-Weld. See Lincoln Elec. Co.
Flex-A-Weld. See Trumbull Elec. Mfg. Co.
General Electric Co., Schenectady, N. Y.
General Engrg. & Supply Co., 160 5th Ave., New York, N. Y
Hansen. See Northwestern Mfg. Co.
Hobart Mfg. Co., Simpson & Penn Sts., Troy, Ohio
Hollup Corp., C. H., 3333 W. 48th Place, Chicago, Ill.
Lincoln Electric Co., Coit Rd. and Kirby Ave., Cleveland
Lundy Co., E. A., Fulton Bldg., Pittsburgh, Pa.
Macleod Co., 2232 Bogen, Cincinnati, O.
Mcadams Co., J. C., New Britain, Conn.
Nigg Engineering Corp., Second St. & Covina Blvd., Covina, Cal.
Northwestern Mfg. Co., 480 Clinton, Milwaukee, Wis.
Owen Elec. Mfg. Co., Fayetteville, N. C.
Plastic Arc. See Wilson Welder & Metal Co.
Pyrotip. See General Elec. Co.
Quasi-Arc., Inc., 11 W. 42nd St., New York, N. Y.
Rhason Mfg. Co., 124 45th, Union City, N. J.
Ryerson & Son, Jos. T., 2558 W. 16th, Chicago, Ill.
Sellars Arc Welder Co., 1200 Fourth Ave., Seattle, Wash.
Seneca Electric Welder Corp., 5867 Woodward, Detroit, Mich
Siemund Wenzel Electric Welding Co., 79 Hancock, Long Island City, N. Y.
Swift Elec. Welder Co., 2567 W Grand Blvd Detroit.
Taylor-Winfield Corp., Mahoning Ave. Warren, O.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Toledo. See Thomson-Gibb Elec. Welding Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Una Welding & Bonding Co., 1615 Collamer Ave., Cleveland, O.
U. S. L. Battery Corp., Niagara Falls, N. Y.

Weldite. See Fusion Welding Corp.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilson Welder & Metal Co., Hoboken factory, Terminal Bldg., Hoboken, N. J.
Zeus. See Thomson-Gibb Elec. Welding Co.
WHEATSTONE BRIDGES. See Instruments, Laboratory Standard.

WICKS, Lubricating
Brawley Felt Co., Inc., T. R., 279 20th, Brooklyn, N. Y.

WINDERS
Armature & Field Coil. See Winding Machines, Armature & Field Coil.
Coil. See Winding Machines, Armature & Field Coil.
Electromagnet. See Winding Machines, Induction Coil.
Filament. See Machines, Lamp Making.
Induction Coil. See Winding Machines, Induction Coil.
Loop. See Winding Machines, Armature & Field Coil.

WINDING MACHINES, Armature and Field Coil

Acme Elec. & Mfg. Co., 1447 Hamilton Ave., Cleveland, O.
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Browning. See Mutual Foundry & Machine Co.
Chapman Electric Works, P. E., 1830 Chouteau Ave., St. Louis, Mo.
Columbia Machine Works & Malleable Iron Co., 263 Chestnut, Brooklyn, N. Y.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Conran, Frederick M., 107 Colden, Newark, N. J.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Handy. See Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Herald Electric Co., 29 East End Ave., New York, N. Y
Hunsdorf, Wm., 2058 E. Fourth, Cleveland, O.
Liberty Starter Co., 241 Vinewood Ave., Detroit, Mich.
Meisner Mfg. Co., 522 S. Clinton, Chicago, Ill.
Mutual Foundry & Machine Co., Atlanta, Ga.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Peerless. See Electric Service Supplies Co.
Ridlon Co., Frank, 253 A St., Boston, Mass.
Segur. See Electric Service Supplies Co.
Seifert, E. R., Syracuse, N. Y.
Superior. See Armature Coil Equipment Co.

WINDING MACHINES, Induction Coil

Acme Elec. & Mfg. Co., 1447 Hamilton Ave., Cleveland, O.
Belden Mfg. Co., 4633 W. Van Buren, Chicago, Ill.
Conran, Frederick M., 107 Colden, Newark, N. J.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J
Leesona. See Universal Winding Co.
Mignon Elec. Corp., 909 Genesee, Buffalo, N. Y.
Morris Register Co., 29th & Broadway, Council Bluffs, Iowa.
Radio Production Machinery Co., 212 Centre, New York
Seifert, E. R., Syracuse, N. Y.
Universal Winding Co., Boston, Mass.
Viking Tool & Machine Co., 745 65th, Brooklyn, N. Y.
Weehawken Engineering & Mfg. Co., 525 Gregory Ave., Weehawken, N. J.

WINDINGS. See Coils, Finished.

WINDOW SHADES, Factory

Athey Co., 6142 West 65th St., Chicago, Ill.

WIRE (Cable) (Cord). Aluminum. See Aluminum.
Copper Clad. See Wire, Copper Clad.
Forms. See Forms, Wire.
Frames. See Forms, Wire.
Fuse. See Fuses and Fuse Wire.
Lamp & Tube Filament. See Filaments, Incandescent Lamp.
Magnet. See Wire, Insulated.
Molybdenum. See Molybdenum.
Phosphor Bronze. See Phosphor Bronze.
Platinum. See Platinum.
Radio Bus. See Wire, Bare.
Scrapers. See Strippers.
Strippers. See Strippers.
Tungsten. See Filament, Incandescent Lamp.

WIRE, Bare

Armature Banding	See S
Copper Wire	See C
Iron Wire	See S
Phosphor Bronze	See B
Radio Bus Wire	See C
Resistance Wire	See R
Steel Wire	See S

Acme. See Alloy Metal Wire Co.
Alpha Wire Corp., 520 Broadway, New York.. C R . .
Advance. See Driver Harris Co.
Alloy Metal Wire Co., Meore, Pa..... C R . .
American Copper Products Corp., 233 Broadway, New York, N. Y. ..... C R . .
American Electrical Works (Phillipsdale), Providence, R. I. ..... C . . . .
American Steel & Wire Co., 208 S. La Salle.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y. ..... C . . . .
Anylite Elec. Co., 200 Murray, Fort Wayne, Ind... C . . . .
Ballast. See Gilby Wire Co.
Baltimore Copper Mills, Div. of Revere Copper & Brass, Inc., Baltimore, Md. ..... C . . . .
Bassett Metal Goods Co., Derby, Conn. (General Sales Agent, Hatheway & Co., 16 Hudson, New York, N. Y. ..... C . . .
Belden Mfg. Co., 4633 W. Van Buren, Chicago..... C . . S
Beldenite. See Belden Mfg. Co.
Bradford, Kyle & Co., Plymouth, Mass..... . . B . .
Braidite. See Cornish Wire Co.
Brenvar. See General Cable Corp.
Bridgeport Brass Co., Bridgeport, Conn..... C . .
Calido. See Driver Harris Co.
Chase Brass & Copper Co., 236 Grand, Waterbury, Conn.

Chromel. See Hoskins Mfg. Co.
Chromic. See National-Harris Wire Co.
Climax. See Driver Harris Co.
Comet. See Driver Harris Co.
Cook Plate Co., Edw. N., 70 Ship, Providence, R. I. C . . . .
Copel. See Hoskins Mfg. Co.
Copperweld Steel Co., Glassport, Pa..... C . . S
Cornish Wire Co., 30 Church, New York, N. Y.. C . . . .
Corwico. See Cornish Wire Co.
Crescent Ins. Wire & Cable Co., Trenton, N. J.. C . . . .
Cromin. See Gilby Wire Co.
Cupron. See Gilby Wire Co.
1885. See Chicago Insulated Wire & Mfg. Co.
Driver-Harris Co., Harrison, N. J..... . . R . .
Electron. See Bassett Metal Goods Co.
Excelicler. See Branford Elec. Co.
Fullman Mfg. Co., Latrobe, Pa..... . . . .
General Cable Corp., 420 Lexington Ave., New York C . . S
Gilby Wire Co., Riverside Ave., Newark, N. J..... R
Goldmark Co., James, 83 Warren, New York.. C . . . .
Hope Webbing Co., 1005 Main, Pawtucket, R. I. (Braided Wire Tape) ..... C . . . .
Hoskins Mfg. Co., 4435 Lawton Ave., Detroit, Mich. .... R . .
Hudson Wire Co., Ossining, N. Y..... C R . .
Ideal. See Driver Harris Co.
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind. ..... C . . S
Karma. See Driver Harris Co.
Keystone. See Fullman Mfg. Co.
Lucero. See Driver Harris Co.
Marion Insulated Wire & Rubber Co., Marion, Ind. C . . . .
Monex. See Standard Alloy Wire Co.
National-Harris Wire Co., Newark, N. J..... . . R . .
Nichrome. See Driver Harris Co.
Novar. See Standard Alloy Wire Co.
Page Steel & Wire Co., Bridgeport, Conn..... . . S
Peerless. See Alloy Metal Wire Co.
Phono-Electric. See Bridgeport Brass Co. & Standard Underground Cable Co.
Premier. See Alloy Metal Wire Co.
Providence Insulated Wire Co., Providence, R. I.. C . . . .
Revolute Wire Co., Hastings-on-Hudson, N. Y.... C . . . .
Rice Co., A. H., Pittsfield, Mass. ..... C . . . .
Roebling's Sons Co., John A., Trenton, N. J..... C . . S
Ross Wire Co., 69 Bath, Providence, R. I..... C . . . .
Rossea Wire & Mfg. Co., Fostoria, O. .... S
Stlcrimp. See Valley Narrow Fabric Co.
Silectron. See Standard Alloy Wire Co.
Silar. See Gilby Wire Co.
Sparge Wire Co., J. A., Rome N. Y..... C . . .
Standard Alloy Wire Co., Div. of National-Harris Wire Co., Newark, N. J..... . . R S
Superior. See Alloy Metal Wire Co.
Talking Tape. See Hope Webbing Co.
Therlo. See Driver Harris Co.
Tophet. See Gilby Wire Co.
Tru-Lay. See Page Steel & Wire Co.
Valley Narrow Fabric Co., 59 Chestnut, Central Falls, R. I
Wheeler Insulated Wire Co., Bridgeport, Conn.. C . . . .

WIRE CLOTH. See Cloth, Wire.

WIRE, Copper Clad

Copperweld Steel Co., Glassport, Pa.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
General Cable Corp., 420 Lexington Ave., New York, N. Y.

WIRE SOLDER. See Solder, Bar and Wire.

WIRE DRAWING MACHINES

Drawing and Re-drawing Mill Equipment for Small Wires
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Sleeper-Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio.
Wire Machinery Corp. of Am., New Haven, Conn.

WIRE FORMING MACHINE

Seifert, E. R., Syracuse, N. Y.

WIRE, Insulated

	KEY
Annunciator, Office, Bell Wire	See A
Asbestos Covered Heater Cord	See H
Asbestos Covered Magnet Wire	See M
Enameled Magnet Wire	See M
Fixture Wire	See B
Flexible Reinforced Heavy Duty Cord	See F
Heater Cord	See H
Ignition Cable	See R
Lamp Cord	See B
Radio Cord	See R
Rubber Covered Wire & Cable	See R
Steve Wire	See H
Telephone Cord	See T

AA. See General Cable Corp.
A-1 Brand. See General Cable Corp.
Amelectric. See American Elec. Wks.
American Braiding Co., Holyoke, Mass. R . . . . . .
American Copper Products Corp., 233 Broadway, New York, N. Y. ....
American Electrical Works (Philipsdale), Providence, R. I. ..... W L
American Insulated Wire Corp., 45 Baker, Providence, R. I. ..... R F . . A T . .
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill. ..... R F H A T .
Americore. See American Steel.
Amerite. See American Steel.
Amerize. See American Steel.
Amparak. See American Steel.

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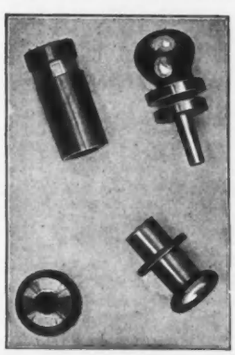

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WIRE, Insulated—Continued

Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y. ..... R F .. A ....
Ansonia Electrical Co., Ansonia, Conn. (Silk Cotton Enameled) ..... A ....
Armorlokt. See American Steel.
Bay State Insulated Wire & Cable Co., Paydras (Mattapan), 26, Boston ..... R .....
Belden Mfg. Co., 4833 W. Van Buren, Chicago, Ill. ..... R F H A T ..
Birnbach Radio Co., 254 W. 31st, New York, N. Y. ..... R .....
Bishop Wire & Cable Corp., 430 E. 25th, New York, N. Y. ..... R F .....
Boston Insulated Wire & Cable Co., 65 Bay, Boston, Mass. ..... R F H .....
Cablex. See Collyer Insulated Wire Co.
Celatsite. See Acme Wire Co.
Collyer Insulated Wire Co., Pawtucket .. R F H .....
Colorbeston. See General Elec. Co.
Colorubber. See Belden Mfg. Co.
Condex. See Simplex Wire Co.
Contact Cable. See Bishop Wire & Cable
Copperweld Steel Co., Glassport, Pa. ..... R ..... T ..
Cotenamel. See Belden Mfg. Co.
Cottonite. See Acme Wire Co.
Crescent Braid, Inc., Providence, R. I. ..... H .....
Crescent Ins. Wire & Cable Co., Trenton, R F H A T ..
Crescord. See Crescent Ins. Wire & Cable Co.
Davis-Jones Insulated Wire Co., Pawtucket, R. I. ..... R F H A T ..
Deltabeston. See York Insulated
Diamond Braiding Mills, Chicago, Heights R F H .....
Di-Noburn. See Diamond Braiding Mill. delphia, Pa.
Dolphin. See General Cable Corp.
Dreadnaught. See Indiana Rubber Co.
Driver-Harris Co., Harrison, N. J. ..... R .. H .....
Ducatto. See General Cable Corp.
Durabilt. See Anaconda Wire & Cable Co.
Duracord. See Anaconda Wire & Cable Co.
Durawire. See Anaconda Wire & Cable Co.
Duro. See McElroy, C. H.
Eagle. See Goldmark Co., James.
Eastern Insulated Wire Co., Tilton, N. H. R .....
1885. See Chicago Insulated Wire.
Enamelite. See Acme Wire Co.
Enterite. See General Cable Corp.
Fibrex. See Simplex Wire Co.
Flexible Woven Cable Co., 755 Boylston, Boston, Mass. ..... F ....
Flex-O-Cord. See Packard Elec. Co.
Gavitt Mfg. Co., Brookfield, Mass. ..... T ..
GE-Flex. See General Elec. Co
General Cable Corp., 420 Lexington Ave., New York, N. Y. ..... R F H A T W
General Elec. Co., Merchandise Dept., W329, Bridgeport, Conn. ..... R F H .....
Giant. See Collyer Insulated Wire
Gilby Wire Co., Riverside Ave., Newark, N. J. ..... H .....
Globe Insulated Wire, 148 Old Colony Ave., Wollaston, Mass. ..... R .....
Goldmark Co., James, 83 Warren, New York, Annunciator and Asbestos, Cotton, Silk ..... A ....
Goodyear Rubber Insulating. See Graybar Electric Co
Graybar Elec. Co., Graybar Bldg., Lexington Ave. & 43rd St., New York, N. Y. R ..... T ..
Grimshaw. See New York Ins.
Hatex See Hatfield Rubber Wks.
Hatfield Rubber Wks., Inc., Hillside & Long Aves., Hillside, N. J. ..... R F H .. T ..
Hazacord. See Hazard Insulated Wire Works.
Hazard Insulated Wire Works, Div. of Okonite Co., Wilkes-Barre, Pa. ..... R F .. A ....
Holyoke Co., 621 Broadway, New York. R .... A ....
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind. ..... R F H .....
I. X. L. See Collyer Insulated.
Kable. See General Cable Corp.
Kenrite. See General Cable Corp.
Kerite Ins. Wire Cable Co., 30 Church, New York, N. Y. ..... R .....
Kilo Co., 2 E. 23d, New York, N. Y. ..... T ..
Koelle, Frederick C., Real Estate Trust Bldg., Philadelphia, Pa. ..... T
Lowell Insulated Wire Co., Lowell, Mass. R F H .....
Liberty. See Nat. Elec. Products Corp.
Lorsteel. See Hazard Insulated Wire Works.
McEvoy, C. H., Lowell, Mass. ..... R ..... T ..
Marion Insulated Wire & Rubber Co., Marion, Ind. ..... R F H A T ..
Montgomery Co., J. R., Windsor Locks, Conn. ..... T ..
Nagy. See Bishop Wire & Cable Corp.
National Elec. Products Corp., Inca Mfg. Div., Fort Wayne, Ind. ..... R F H A T ..
National-Harris Wire Co., Newark, N. J. R .....
Neptune. See General Cable Corp.
New England Elec. Wks., Lisbon, N. H. R .....
N. E. See New England Elec. Wks.
New York Insulated Wire Co., 114 Liberty, New York, N. Y. ..... R .....
Nitro. See Belden Mfg. Co.
O. K. See General Cable Corp.
Okocord. See Okonite Co.
Okonite Co., Passaic, N. J. ..... R .....
Ozex. See Simplex Insulated Wire
Packard Electric Co., Warren, O. ..... R F .....
Parac. See General Cable Corp.
Paracore. See U. S. Rubber Co.
Paraflex. See Bishop Wire & Cable.
Paranite. See Indiana Rubber.
Parkerite. See Seward Wire Co.
Peer See Packard Elec. Co.
Philadelphia Insulated Wire Co., 200 N. Third, Philadelphia, Pa. ..... H A T ..
Providence Insulated Wire Co., Providence R F H A ....
Pyroproof. See Hatfield Rubber Works, Inc.
Raven Core. See New York.
Reliance. See American Steel.
Riga. See Birnbach Radio Co.
Rockbestos Products Corp., 389 Nicoll, New Haven, Conn. ..... R .. H .. T ..
Roebling's Sons Co., John A., Trenton, N. J. ..... R F H A T ..
Rosa Wire Co., 69 Bath, Providence, R. I. R .....
Romoxide. See General Cable Corp.
Ruffcoat. See General Cable Corp.
Salamander. See York Insulated.
Seward Wire Co., Parkersburg, W. Va. R .....
Silkenamel. See Belden Mfg. Co.
Silkenite. See Acme Wire Co.
Simcore. See Simplex Wire.
Shield. See Ansonia Elec'l Co.
Simplex Wire & Cable Co., 201 Devonshire, Boston, Mass. ..... R F H .. T ..
Spiralweave. See Hazard Ins. Wire
Standard Alloy Wire Co., Div. of National-Harris Wire Co., Newark, N. J. ..... H .....
Sterling. See General Cable Corp.
Sterling Insulated Wire Co., Fall River, Mass. ..... R .....
Super-Service. See General Cable Corp.
Sweetstrand. See Strand & Sweet.
Tip-Top. See General Cable Corp.
Tirex See Simplex Wire & Cable.
Trenchlay. See General Cable Corp.
Triangle Conduit Co., Dry Harbor Rd. & Cooper Ave., Brooklyn ..... R .....
Triton. See General Cable Corp.
Tubular Woven Fabric Co., Pawtucket, R. I. ..... R F .....
United States Rubber Co., 1790 Broadway New York, N. Y. ..... R .. H A T .
U. S. Royal. See United States.
Warrior. See American Copper.
Wheeler Insulated Wire Co., Bridgeport, Conn. ..... R F H .. T ..
White, J. M., 1128 Olive, Philadelphia, Pa. ..... R F H .. T
Whitney Blake Co. See Graybar Electric Co.
Wovenite. See Flexible Woven.
York Insulated Wire Wks. of G. E. Co., 120 Broadway, New York, N. Y. ..... R .. H .....

WIRE, Magnet

Acme Wire Co., New Haven, Conn.
Alpha Wire Corp., 520 Broadway, New York, N. Y.
Amalac. See Direct Line Telephone Co.
American Electrical Works (Phillipsdale) Providence, R. I.
American Enameled Magnet Wire Co., Muskegon, Mich.
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill.
Anaconda Wire & Cable Co., Maring Wire Branch, Muskegon, Mich.
Ansonia Electrical Co., Ansonia, Conn.
Belden Mfg. Co., 4833 W. Van Buren, Chicago, Ill.
Celatsite. See Acme Wire Co.
Cotenamel. See Belden Mfg. Co.
Cottonite. See Acme Wire Co.
Crescent Ins. Wire & Cable Co., Trenton, N. J.
Ducatto. See General Cable Corp.
General Cable Corp., 420 Lexington Ave., New York, N. Y.
Enamelite See Acme Wire Co.
Fawcett, Hughes, Inc., 115 Franklin, New York, N. Y.
Goldmark Co., James, 83 Warren, New York, N. Y.
Holyoke Co., 621 Broadway, New York, N. Y.
Inland Wire & Cable Co., Sycamore, Ill.
Kilo Co., 2 E. 23rd, New York, N. Y.
Massachusetts Electric Mfg. Co., West Lynn, Mass.
National Elec. Products Cor., Inca Mfg. Div., Fort Wayne, Ind.
New England Electrical Works, Lisbon, N. H.
Revolute Wire Co., Hastings-on-Hudson, New York.
Rockbestos Products Corp., New Haven, Conn.
Roebling's Sons Co., John A., Trenton, N. J.
Strand & Sweet Mfg. Co., Winsted, Conn.
Sweetstrand. See Strand & Sweet Mfg. Co.
Varflex Co., Rome, N. Y.
Wheeler Insulated Wire Co., Bridgeport, Conn.
Winsted Insulated Wire Co., Winsted, Conn.
York Insulated Wire Wks. of G. E. Co., 120 Broadway, New York, N. Y.

WIRE MANUFACTURING MACHINES

(See Also Wire Drawing Machines; Insulation Mixers. Taping Machines, Wire; Wire Polishing Machines Enameling Machines for Magnet Wire; Wire Wrapping Machines; Vulcanizers, Wire Insulation.)

Armoring Machines ..... See A
Braiding Machines ..... See B
Bunching Machines ..... See B
Covering Machines ..... See I
Insulating Machines ..... See I
Insulation Straining Machines ..... See I
Measuring Machines ..... See M
Park Cabling Machines ..... See A
Saturating Tanks ..... See F
Spooling Machines ..... See U
Stranding Machines ..... See S
Timing Tanks ..... See F
Winding Reels ..... See U

Adamson Machine Co., Akron, Ohio .. I A .....
Aimes-Seward See American Insulating Machinery Co.
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa. I A .... S U F
Bradford, Kyle & Co., Plymouth, Mass. Essex, Paterson, N. J. ..... I .....
Breguet. See American Insulating
Crescent. See Royle & Sons, John.
Durant Mfg. Co., 662 Buffum, Milwaukee, Wis. ..... M .. U ...
Fidelity Machine Co., 2902 Frankford Ave., Philadelphia, Pa. ..... B .....
Housatonic Machine & Tool Co., Bridgeport, Conn. ..... I ..... U ..
Minneapolis Elec. & Construction Co., 80 S. 12th St., Minneapolis, Minn. ..... M .. U ..
Nebutteo. See New England Butt Co.
New England Butt Co., 324 Pearl, Providence, R. I. ..... I A B M S U ..
Peerless. See Royle & Sons, John.
Robertson Co., John, 121 Water, Brooklyn, N. Y. ..... A .....
Royle & Sons, John, Paterson, N. J. I .....
Sleeper & Hartley, Inc., Worcester, Mass. ..... A .... S U
Terkelsen Machine Co., Terkelsen Bldg., Boston, Mass. ..... M .....
Textile Machine Works, Reading, Pa. .... B .....
Universal Wire Machy. Co., 69 Daggett, New Haven, Conn. ..... A ..... U F
Utility Mfg. Co., Cudahy, Wis. ..... I .....
Wardwell Braiding Machine Co., Central Falls, R. I. ..... B .....
Watson Machine Co., 74 Railroad Ave., Paterson, N. J. ..... I .....
Wire Machinery Corp. of Am., New Haven, Conn. ..... M S U ..
Weir. See Housatonic Machine

WIRE POLISHING MACHINES

(See Also Wire Manufacturing Machines).

American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
New England Butt Co., 324 Pearl, Providence, R. I.

WIRE, Steel Flat

Steel Coating for Armored Conductor.
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill
Crescent Insulated Wire & Cable Co., Trenton, N. J.
Roebling's Sons Co., John A., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.

WIRE STRAIGHTENING MACHINES

Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Franklin Mfg. Co., New Haven, Conn.
Kane & Roach, Syracuse, N. Y.
Shuster Co., F. B., New Haven, Conn.
Seifert, E. R., Syracuse, N. Y.

WIRE TAPING MACHINES. See Taping Machines, Wire.
WIRE VULCANIZING MACHINES. See Vulcanizers

WIRE WRAPPING MACHINES

Terkelsen Machine Co., Terkelsen Bldg., Boston, Mass.

WOOD BLOCKS. See Cabinets & Boxes, Wood.
Boxes. See Cabinets & Boxes, Wood
Cabinets. See Cabinets & Boxes, Wood
Pulleys. See Pulleys, Composition.
Woods Metal. See Radio Mountings.

WRAPPERS, Paper. See Boxes and Wrappers.
WRAPPERS, Tungsten Lamp. See Boxes and Wrappers.

YARN AND THREAD; Silk, Cotton, Asbestos

Allbestos Corp., 21st & Godfrey Ave. (Germantown), Philadelphia, Pa.
Amalier Asbestos Shingle & Sheathing Co., Ambler, Pa.
American Asbestos Co., Norristown, Pa.
American Glanzstopf Corp., 180 Madison Ave., New York.
Anchor Thread Co., Trenton (Grovesville), N. J.
Asbestos Fibre Spinning Co., North Wales, Pa.
Columbian Rope Co., Auburn, N. Y.
Commercial Rayon & Thread Co., 19 W. 31st, New York.
Firzolo & Asbestos, Inc., New Brunswick, N. J.
Florsheim, H. A., 225 Fifth Ave., New York, N. Y.
Franklin Rayon Corp., 86 Crazy, Providence, R. I.
General Electric Co., Schenectady, N. Y.
Great Lakes Yarn & Thread Co., Div. of General Cable Corp., 5133 Wesson Ave., Detroit, Mich.
Johns-Manville Corp., New York, N. Y. (Asbestos.)
Kubar Mfg. Co., Davidson, N. C.
Lees Mfg. Co., 320 Broadway, New York, N. Y.
Multiple Winding Co., 77 Summer, Boston, Mass.
Rich & Co., H. S., 180 E. Water, Providence, R. I.
Ryle & Co., Wm., 381 Fourth Ave., New York, N. Y.
Silkslip. See Worcester Bleach & Dye Wks. Co.
Smith & Dove Mfg. Co., Andover, Mass. (Linen Thread.)
Worcester Bleach & Dye Wks., Worcester, Mass.

ZINC

Bunker Hill. See St. Joseph Lead Co.
Horse Head. See New Jersey Zinc Co.
New Jersey Zinc Co., 160 Front, New York, N. Y.
Platt Bros. & Co., Waterbury, Conn. (Strips.)
St. Joseph Lead Co., 250 Park Ave., New York, N. Y.
United Metals Selling Co., 25 Broadway, New York, N. Y.

ZINCS AND COPPERS, Battery

Bunker Hill. See St. Joseph Lead Co.
Bunnell & Co., J. H., 215 Fulton, New York, N. Y.
Eagle Mfg. Co., Plymouth, Mass.
Extruded Metal Corp., 184 53rd, Brooklyn, N.Y. (Zinc Cups.)
Franklin. See Grasselli Chemical Co.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Illinois Zinc Co., Peru, Ill.
Lind Mfg. Co 70 Wyckoff Ave., Brooklyn, N.Y. (Zinc Cups.)
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
New Jersey Zinc Co., 160 Front, New York, N. Y.
St. Joseph Lead Co., 250 Park Ave., New York, N. Y.

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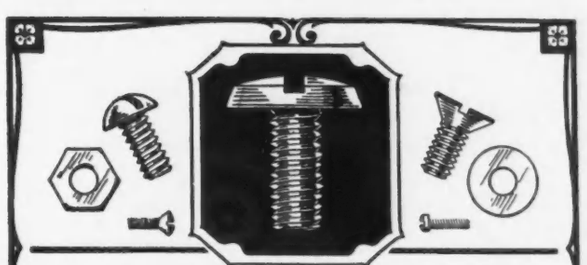

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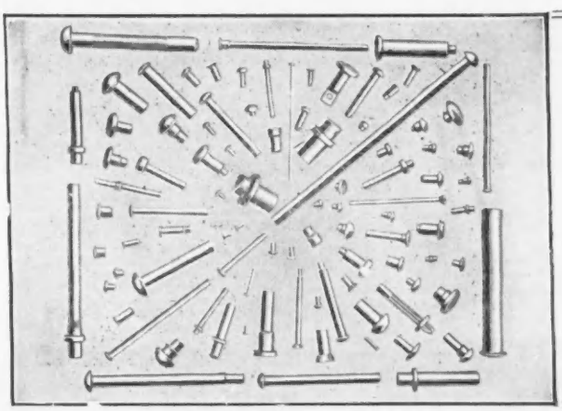

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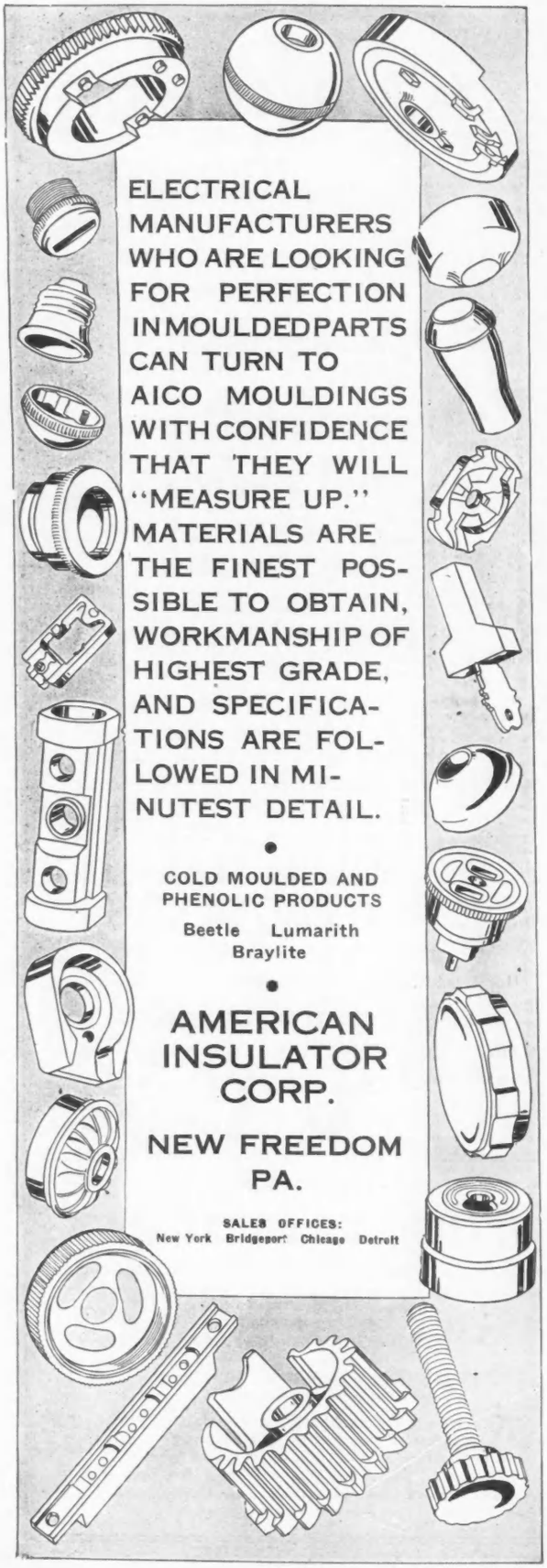
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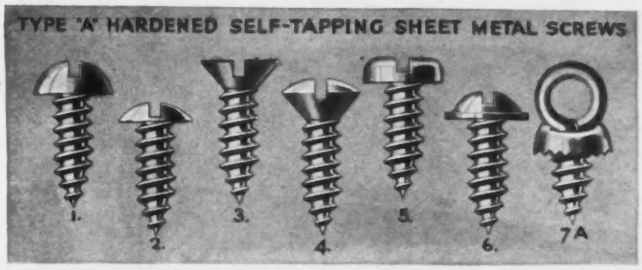

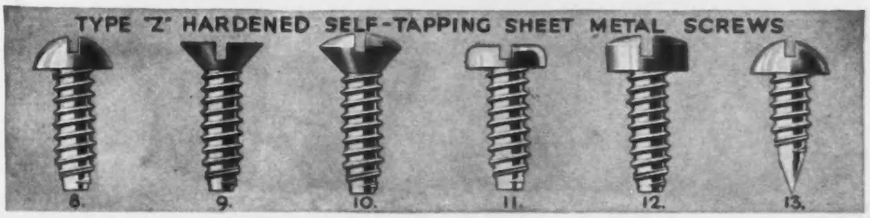

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